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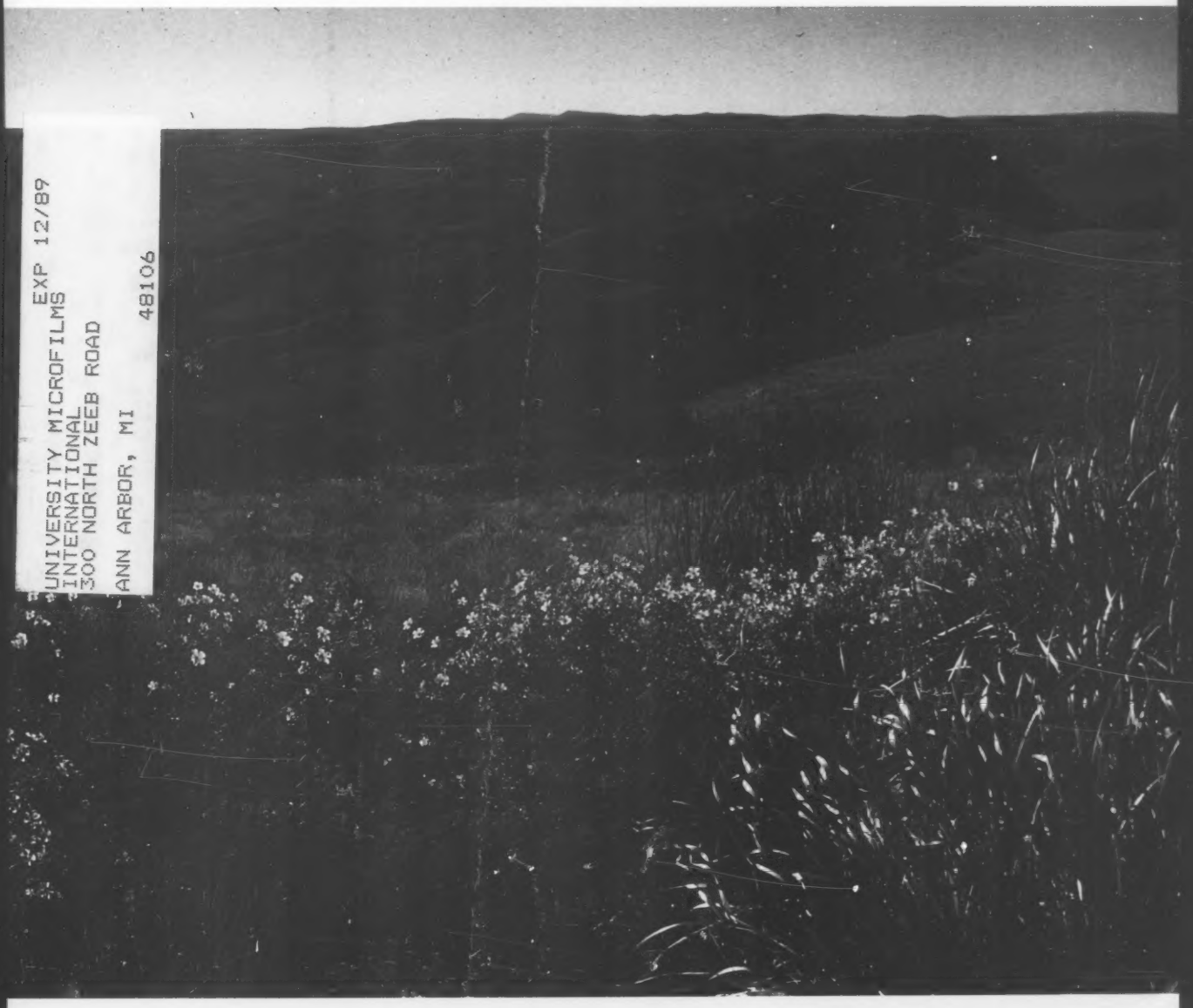

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Thoughts From the President . . .

By
Robert B. Gravani, Ph.D.
IAMFES President

As you know, Food Safety issues have been in the national news the last several months. Pesticide residues on apples, potatoes, and bananas, aflatoxins in corn, cyanide in Chilean grapes, as well as a botulism outbreak in New York have stimulated a tremendous amount of media coverage of the safety of our food supply.

Recent headlines in newspapers and magazines like these:

- Scared USA Asks: Is Any Food Safe? — USA Today
- Is That Food Really Safe? — New York Times
- Fungus in Corn Crops, A Potent Carcinogen, Invades Food Supplies — The Wall Street Journal
- Is Anything Safe? How Two Tainted Grapes Triggered a Panic About What We Eat — Time Magazine
- How Safe is Your Food? — Newsweek Magazine
- Consumer Confidence in the Safety of Fresh Food May Face Lasting Damage — New York Times

have eroded consumer confidence in our foods.

Newsweek Magainze, in their March 27th issue, published the results of a poll that they commissioned the Gallup Organization to conduct. Gallup pollsters interviewed a national sample of 756 adults by telephone on March 16 & 17, 1989. The results of the study showed that Americans surveyed still believe their food is safe, but there are more worries and calls for improvements in the system. The study was reported in tabular form in four major headings. Selected portions are discussed below. For further information, consult the March 27th issue of Newsweek Magazine.

1. *Fears About Food*
   38% of the survey respondents are more worried that the food they eat may be contaminated by pesticides or other toxic chemicals
   6% are less worried
   53% about the same
2. *Pesticides*
   73% of the people polled think fewer pesticides and chemicals should be used to ensure safer food even if it means higher prices.
3. *Buying Habits*
   Many survey respondents said they're worried about these commodities or have cut purchases of the following foods:
   apples (44%)
   vegetables (41%)
   eggs and poultry (23%)
   fish (25%)
   milk (9%)
   corn (11%)
4. *Confidence in the U.S. Government*
   52% feel that the government ensures food produced in the U.S. is safe.
   44% feel food imported from foreign countries is safe.

The margin of error for this poll is plus or minus 4 percentage points and some "don't know" and other answers were omitted.

The bottom line is that consumers are confused and probably do not know who to believe or what facts are true.

Because of your interest in food safety and sanitation, you will undoubtedly be asked many questions about these important issues and on the safety of our foods.

How will you respond?

What can you do to assist consumers in understanding these complex issues and problems?

There are some things that you can do to assure concerned consumers that our food supply is safe.

1. Become well informed about the particular issue(s). Learn about all the aspects and views (pro and con) on the issues from knowledgeable colleagues, organizations and agencies that are investigating the situation.
2. Gather all the facts on the issue and formulate a reasonable and thoughtful response.
3. Make your responses clear and concise.
4. Provide consumers with tips or instructions that they can use to assess the situation and make a decision on the issue.
5. Be proactive and share your views with the media, consumers or other organizations.
6. If you feel that you are not fully informed, refer consumer inquiries to knowledgeable sources who will provide useful information.

There is no substitute for the facts in these matters. Provide solid information, make some suggestions or recommendations and assist consumers in making an informed decision.

As you know, there is no such thing as absolute safety. Just as there are no guarantees that crossing the street will be safe, we must use risk assessment and risk/benefit analyses to assess the degrees of risk involved in each of these particular issues.

Consumers must realize that our food supply is not perfect and that there are some concerns, but we still have the safest and most wholesome food supply in the world. We need industry, regulatory agencies, scientific organizations and consumers working together to solve these problems. By working together we can help restore consumer confidence in our food supply.

On another note, plans for our 76th Annual Meeting at the Hyatt Regency Crown Center in Kansas City on August 13-17, are coming along quite well. Won't you join us for this important and innovative session?

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ABOUT THE COVER...*Photo courtesy of The Wyoming Travel Commission. CORRECTION: The February cover of DAIRY, FOOD AND ENVIRONMENTAL SANITATION had George Washington on the wrong side of Mount Rushmore. I thought about saying we did it on purpose to see if you'd notice, but the truth is, the separations were turned around in printing. Thanks to those of you who did notice and called it to our attention.*

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Enhanced Bioremediation Techniques for In Situ and On Site Treatment of Petroleum Contaminated Soils and Groundwater

by

Samuel Fogel, Robert Norris, Everett Crocket, and Margaret Findlay

Introduction

Bioremediation is a process by which organic contaminants are destroyed by the action of soil bacteria. Since the constituents of petroleum products are naturally-occurring chemicals, soil bacteria capable of degrading them are relatively ubiquitous. These bacteria are capable of obtaining energy by breaking down petroleum hydrocarbons to carbon dioxide and water, as well as incorporating portions of the hydrocarbon to support their own growth. The types of petroleum products that we have treated by biological degradation include gasoline, jet fuel, #2, #4, and #6 heating fuels, diesel fuel, waste oil, and cutting oil.

Bioremediation involves increasing the numbers of these organisms in the contaminated soil by adding mineral nutrients and oxygen, which they require for growth. During petroleum degradation it is typical for several different kinds of bacteria to cooperate in the breakdown of the hydrocarbons.

Bioremediation can be carried out in situ for saturated soils located below the water table. Unsaturated soils can also be treated in situ or on site. The same principles are involved, but the methods of delivering the oxygen and mineral nutrients differ. In this paper, two case studies will be presented, in order to illustrate both types of soil treatment.

In Situ Aquifer Treatment

When saturated soils are contaminated with petroleum hydrocarbons, a portion of the contaminant becomes dissolved in the groundwater. However, since most of the constituents of petroleum products are relatively insoluble, a major portion of the contaminant will be trapped between soil particles or absorbed to the soil. Depending on the spill and on hydrogeological conditions, there may be free product on the water that can be removed.

Traditional Approach. If the groundwater is pumped to the surface, the pumped groundwater can be treated above the ground. This approach is not cost-effective, however, since it would take years of pumping to dissolve all of the petroleum trapped in the subsurface soils.

In Situ Approach. Compared to the "pump and treat" approach mentioned above, biodegradation in place is a faster and less costly method for the treatment of contaminated soil below the water table. In this approach, the oxygen and mineral nutrients are delivered to the contaminated area so that the bacteria can degrade the dissolved, absorbed, and trapped hydrocarbons in place. The delivery of the nutrients is accomplished by dissolving them in groundwater that is recirculated through the contaminated area. Figure 1 illustrates this process: Groundwater is withdrawn from wells located down-gradient of the contaminant, amended, and reinjected up-gradient using wells or trenches.

Oxygen Amendment. The biodegradation of petroleum requires about 3 pounds of oxygen for every pound of petroleum hydrocarbons degraded. Thus an efficient means of oxygen transfer to the groundwater must be devised. Sparging with gaseous oxygen can deliver only 40 ppm at the injection point. Hydrogen peroxide, however, can be dissolved and injected at concentrations above 500 ppm and will gradually break down to oxygen during transport through the contaminated area. Therefore, although the use of hydrogen peroxide requires special design steps and handling procedures, it is employed by CAA to achieve this more efficient aquifer treatment, since its use shortens treatment time and overall cost.

Case Study: In Situ Saturated Soil Treatment. Cambridge Analytical Associates (CAA) Bioremediation Systems, working jointly with W.W. Irwin, a Southern California geotechnical firm, has just completed remediation of contamination at a former retail gasoline site in Southern California. This project is one of several that W.W. Irwin and CAA are working on together.

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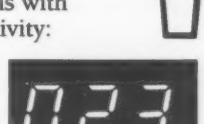

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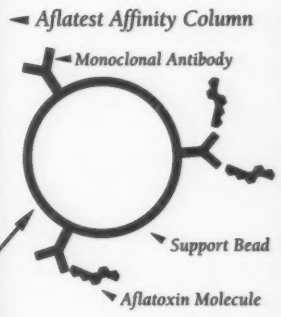

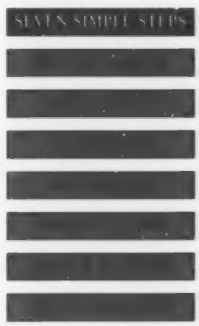

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In Situ Design. The design process is the critical element of any biological treatment approach. For in situ aquifer remediation, hydrogeological testing and geochemical analysis is necessary to determine the location and total amount of contaminant, the direction and rate of groundwater flow, and to characterize the aquifer sufficiently to control the groundwater flow. In addition, numerous laboratory tests are carried out on the contaminated soil and groundwater to determine bioremediation design parameters.

At this site, soil borings defined an area of unsaturated soil contamination of approximately 40' x 50', which was to be remediated by soil vapor extraction. The water table existed at a depth of about 60 feet. Soil in the saturated zone below that depth consists of sandy clay having a hydraulic conductivity of 10^{-5} to 10^{-4} cm/second, which was judged sufficient for groundwater recirculation. The groundwater in this area had concentrations of total petroleum hydrocarbons as high as 220 ppm, including 24 ppm of BTX (benzene, toluene, plus xylenes). Pumping tests carried out at monitoring wells in this area demonstrated the distance that could be influenced by pumping, and the flow that could be expected.

Laboratory Tests. Groundwater and soil from the contaminated saturated zone were subjected to a number of laboratory tests to obtain data for the remedial design. First, the total bacterial population as well as the numbers of bacteria capable of using gasoline as their only food source were documented by standard plate counting techniques. The gasoline-degraders ranged from 20,000 to 300,000 per milliliter of groundwater, amounting to between 2% and 10% of the total bacteria count.

A series of tests were performed on the soils and groundwater to provide information for the formulation of the chemical nutrient mixture. These included analysis of the groundwater for bacterial nutrients such as nitrogen and phosphate, and for cations likely to interfere with nutrient addition. These were followed by experiments to determine the solubility in site groundwater of CAA's proprietary ACT bacterial nutrient mixture. Other experiments measured the absorption of ACT nutrients onto site soil. Following this, the stability of hydrogen peroxide was measured in various ACT nutrient/soil mixtures to determine the adjustments necessary to achieve the desired rate in the soil of peroxide hydrolysis to oxygen.

Before installation, the bioremediation design was tested by a laboratory treatment simulation in which site soil and groundwater were placed in sealed containers with gasoline, ACT nutrients and oxygen, and the rate of biodegradation determined by analysis of samples using gas chromatography with flame ionization detection (GC/FID). These data are represented in Figure 2. It indicates that satisfactory biodegradation of the gasoline will occur with nutrient additions that were determined to be required for optimal soil/groundwater interaction.

As a result of the hydrogeological and laboratory testing, the treatment design was prepared. This consisted of (1) specifications for number and placement of injection, recovery, and monitoring wells, (2) groundwater pumping rates, (3) schedule and rate of nutrient and peroxide addition, and (4) sampling/monitoring schedule. The design document was presented to the State of California Regional Water Quality Board, which issued the permit. Figure 3 illustrates placement of wells on the site.

Field Data. Groundwater amended with mineral nutrients (ammonium and phosphate salts), and hydrogen peroxide was circulated through the contaminated area for ten months, achieving approximately 3 cycles through the treatment zone. Groundwater samples from the extraction wells were analyzed monthly to monitor the treatment process. Total Petroleum Hydrocarbon (TPH) analyses during the first six months showed an average of 15 ppm. During the seventh month the value fell to 0.1 ppm, after which the TPH content of the groundwater dropped to below the detection limit and remained un-detectable for the next three months. The remediation, as measured by TPH and BTX concentrations in groundwater samples, was complete within six months of operation. Operation was continued for an additional four months to provide documentation for closure.

The mineral nutrients, nitrogen and phosphorus, added to the re-injected water, are adsorbed to subsurface soils, and are utilized by the active bacteria in the treatment zone. The appearance of these elements in the extracted groundwater is evidence that sufficient concentrations are being added to satisfy the needs of the active bacteria. The "breakthrough" of mineral nutrients was indicated by an increase in their concentrations in the extraction wells. The concentration of phosphate in the extraction wells averaged only 0.5 ppm during the first 6 months of operation, then increased to an average of 4 ppm during the last 4 months. Similarly, ammonium concentrations in the extraction wells were not detectable during the first seven months but increased to 0.7 ppm during the last three months.

Additional data which served to confirm the nature of the treatment process were counts of gasoline-degrading bacteria and measurements of dissolved oxygen in groundwater samples from the extraction wells. Although the majority of bacteria associated with the degradation of the contaminant are expected to be attached to soil particles in the treatment zone, bacteria in the groundwater samples can give an indication of conditions in the treatment zone. During the first month of treatment the number of gasoline-degrading bacteria in the extraction wells averaged 20,000 per ml. This value increased gradually during the treatment period to 300,000 per ml by the eighth month. These data indicate that the addition of hydrogen peroxide to the groundwater, and its subsequent conversion to oxygen in the treatment zone, were properly controlled and did not damage the bacterial population.

Measurements of the dissolved oxygen concentrations in the extraction wells confirm that sufficient hydrogen peroxide was added to maintain a satisfactory oxygen level in the subsurface treatment zone. The values obtained before the initiation of treatment were approximately 2 ppm. During treatment, although the rate of oxygen use was high, 3 to 4 ppm of dissolved oxygen was maintained.

Conclusion. Three months of non-detectable hydrocar-

bons in the groundwater indicate that the site has been cleaned up. Borings in the original contaminated area are being carried out to confirm that the soil no longer contains gasoline.

This case history is significant because it demonstrates that bioremediation can be brought about in slowly permeable soils and can result in reduction of contamination in groundwater to concentrations below the detection limit.

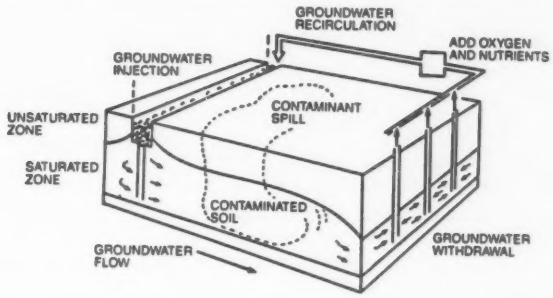

Figure 1. *In situ treatment of contaminated saturated soil by recirculating amended groundwater through the contaminated region.*

Excavated Soil Treatment

Soil which is contaminated by petroleum hydrocarbons may be excavated from a spill site, either to prevent further contamination of underlying strata or to permit excavation of a leaking tank. Such soil has traditionally been hauled to a "disposal site" and replaced with clean backfill. Recently the cost of soil disposal has risen sharply, making biological treatment a cost-effective alternative. Furthermore, biological treatment results in the destruction of the contamination and the elimination of future liability.

The general approach to excavated soil remediation is similar to saturated soil treatment described above, in that mineral nutrients and oxygen must be delivered to the soil bacteria. In addition, the moisture content of the soil must be maintained at an optimal level for bacterial activity. To accomplish this, a carefully engineered soil mound is constructed containing a network of perforated pipe for forcing air through the soil. A second network of pipes is provided for water delivery. The mound is usually constructed on a pad and underdrained to collect run-off. A generalized diagram of a soil treatment mound is given in Figure 4. The following case study will illustrate our approach to this type of remedial challenge.

Case Study, Excavated Soil Treatment. CAA is currently conducting on site treatment of 3,000 cubic yards of soil contaminated with diesel fuel. Our activities were initiated with composite sampling and analyses of the soil to determine the amount of contamination and the extent of "weathering" that had occurred. Following this, a number of laboratory tests were carried out to determine soil characteristics, moisture holding capacity, air permeability, and mineral nutrient content. The soil was found to be fine sand with silt having sufficient permeability to allow treatment.

A biodegradability test was performed to document the presence of an active microbial population and to investigate nutrient requirements. For this test, samples were placed in water in sealed bottles with excess mineral nutrients, such as nitrogen and phosphate, and with excess oxygen. The bottles were analyzed at different times to measure the rate of destruction of the diesel contaminant. Under these conditions, 93% of the diesel fuel disappeared in 10 days. Similar bottles, lacking mineral nutrients, showed no significant change in contamination in 10 days. These data are shown in Figure 5. This test demonstrated that a healthy population of fuel-degrading bacteria existed in the contaminated soil.

The Treatment System. A six foot high soil pile which covered an area of 200 feet by 60 feet was constructed on site. Forced aeration ductwork and water/nutrient delivery systems were incorporated in a manner similar to the design in Figure 4. The treatment system also included a leachate recovery and recirculation system and optional carbon treatment of off-gasses. The initial concentration of total petroleum hydrocarbons (TPH) was approximately 2,800 ppm. During pile construction and the first several weeks of treatment this value dropped to 1,100 ppm TPH. After the forced aeration system and nutrient delivery system became fully operational, the TPH dropped to 800 ppm. Completion is expected to be achieved in a few months. During this time, project monitoring will be carried out in order to obtain data for process control. This will include enumeration of fuel-degrading bacteria and analyses for mineral nutrients in soil samples from the treatment pile.

Conclusion:

The data from these two case studies demonstrate the efficacy of bioremediation of contaminated soil. To our knowledge, this aquifer remediation is the first published documentation of a commercial in situ hydrocarbon remediation using hydrogen peroxide as the oxygen source. Previously a pilot demonstration of this process was carefully documented and published by the American Petroleum Institute[1]. Both in situ aquifer treatment and on site soil pile treatment processes are promising new cost-effective alternatives to costly traditional approaches.

References

[1]API Publication No. 4448. American Petroleum Institute, 1220 L. Street, Northwest, Washington, D.C. 20005.

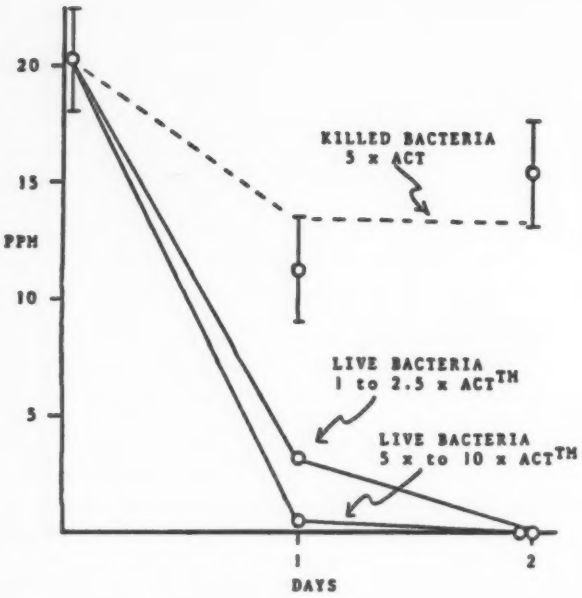

Figure 2. *Laboratory Biodegradation Documentation. Groundwater and soil from the saturated zone of gasoline-contaminated site, in a sealed container with gasoline, ACT™ mineral nutrients, oxygen, and naturally present gasoline-degrading bacteria. Compounds analyzed were benzene, toluene , ethylbenzene, xylenes, and trimethylbenzene.*

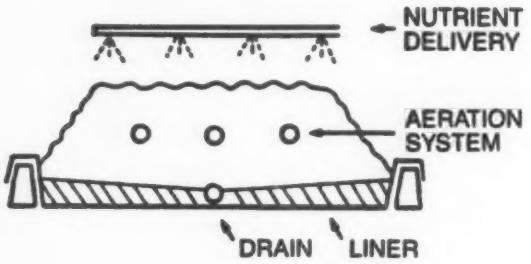

Figure 4. *On site treatment of excavated contaminated soil by CAA Bioremediation System's Forced Aeration Contamination Treatment FACT™ process.*

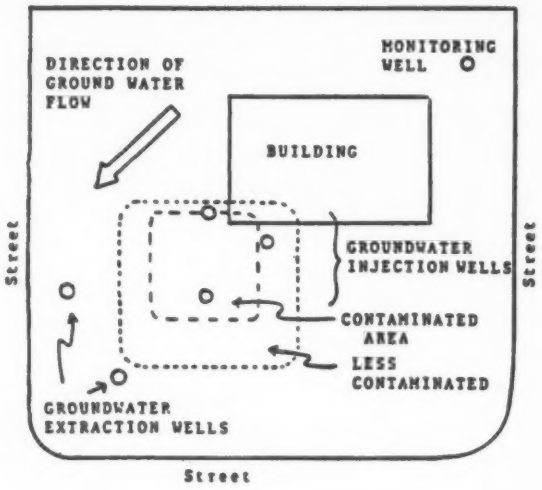

Figure 3. *Site Diagram for remediation of saturated soil and groundwater contaminated with gasoline. Naturally occurring bacteria in the contaminated region are stimulated to degrade the contaminants in situ by recirculating groundwater amended with mineral nutrients and an oxygen source through the contaminated region.*

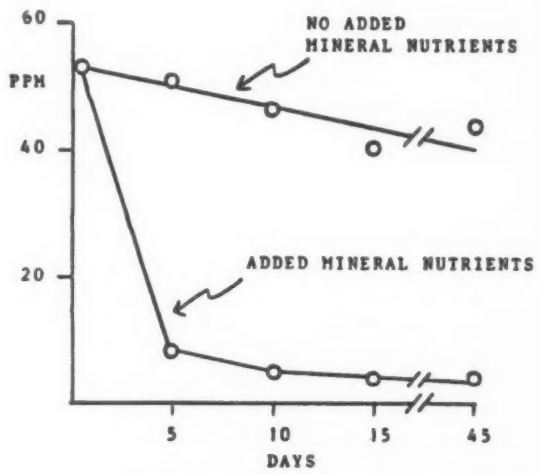

Figure 5. *Biodegradability test for diesel fuel in contaminated soil from the site of on site soil pile treatment. Contaminated soil containing naturally occurring fuel-degrading bacteria was placed in sealed containers with excess mineral nutrients, oxygen, and water. Samples were analyzed after different amounts of time to show the progress of biodegradation. The data is given in terms of the sum of the 18 major constituents of diesel fuel, analyzed by gas chromatography with flame ionization detection.*

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Structural Change in the U.S. Food Distribution System: Implications for Dairy Processors and Their Markets

by

Larry G. Hamm, Associate Professor
Michigan State University

Paper presented to the United Dairy Industry Association, September 14, 1988 in Rosemont, Illinois.

Introduction

Dairy plant ownership changes are occurring at near dizzying speed. Beatrice sells its fluid operations to Borden. Knudsen is no longer with us and Kraft is now the second leading food service distributor. These are all trends and factors in what economists have come to call industrial market structure. This paper attempts to look at the current structure of dairy processing industries. To help focus the discussion, dairy markets are classified within specific strategic groups or market channel segments. The paper concludes by enumerating some possible implications of structural and market channel change for the various U.S. dairy industries.

Why is Market Structure Important?

Economists define market structure as the significant features of a market which affect the behavior of firms supplying that market (1, p. 17). Economists are most fond of talking about competitive markets. The structure of competitive markets is such that there are sufficient numbers of suppliers in a market so that no supplying firm has or perceives that it has any effect on the market's outcome. Economic theory has also developed a second market model called monopoly. Monopoly is characterized by the concept that a single supplying firm has economic power to restrict market output and thereby increase prices. Both the competitive and the monopoly market models give definitive market solutions to economists' questions of how much will be produced and at what price. For the most part, neither of these idealistic models reflect real world marketing situations.

A school of economic theory evolved to develop a framework for analyzing marketing systems characterized by industries with several dominant firms each having some power over the market but yet not having sufficient power to control the market as do monopolists. That branch of economic theory became known as Industrial Organization (IO) theory and its formulation is summarized in Figure 1.

In its most basic form, the IO model starts with standard supply and demand factors making up the basic conditions within which markets operate. The basic conditions help define market structure. Figure 1 lists some of the most basic structural variables. The IO theory postulates that these structural conditions define firm's market actions and con-

Figure 1. *A model of industrial organization analysis.*

duct. Pricing, advertising, promotions, R & D behavior, etc. are all consequences of a markets structure. For example, in a perfectly competitive market individual firms have no choice but to sell their products at the going market rate. This is because their sales are insignificant and their products are viewed by consumers as being no different from that of the other firms in the market. Modern market structure is such that each industry must be studied to understand how it will act and react over time. The composite behavior of all firms in the industry leads to economic performance (Figure 1).

Economists' performance is substantially different from performance, viewed by firms' owners/managers. Therefore it is usually not in MBA curriculum. However, the IO formulation in Figure 1 has two powerful characteristics. First, it is predictive. The arrows that connect basic supply and demand conditions to market structure through conduct to performance provide a method for speculating (albeit informed) about the likely behavior of a given industry. Second, the model is dynamic. In any time period the actions of the industry will feed back (the dotted lines in Figure 1) on to the other elements of the model. This allows the analyst to predict the future. These two characteristics have resulted in this basic formulation being the center of much of the recent Harvard Business School formulation of a strategic planning theory (11). This formulation can be used to analyze economic power. It is this orientation which is used in the paper.

Dairy Processing Industry Structure

The Number of Sellers

Perhaps the basic market structure variable is the number of sellers (processors, manufacturers, etc.) firms within the market. Economists normally measure this variable by a 4-firm concentration ratio (CR-4). A CR-4 is the percentage of the industry's sales that are controlled by the 4 largest firms in that industry. It is designed to measure the degree of economic power held by the industry's leading firms. The higher its value, the greater the autonomy that individual firms have in determining competitive factors such as price product advertising, promotion, etc.

TABLE 1. *Number of firms and the percent of selected industries' shipments controlled by the four largest firms; 1967, 1977 and 1982.*

	1982		1977		1967	
Industry	No. of Firms	Percent	No. of Firms	Percent	No. of Firms	Percent
Butter	61	29	124	30	510	14
Natural and Processed Cheese	575	35	660	38	891	45
Condensed and Evaporated Milk	132	33	166	32	179	35
Ice Cream	482	22	507	27	713	32
Fluid Milk	854	15	1,516	17	2,988	21

Source: U.S. Department of Commerce, *1982 Census of Manufactures Dairy Products Industry Series* and *Concentration Ratios in Manufacturing*.

Table 1 has the most recent statistics available on the full array of dairy industries classified by the Bureau of the Census. These CR-4's are taken from the 1982 Census of Manufacturing published in 1986 (14). Unfortunately, these are the only systematic structural data available. Generally speaking, when measured on a national market basis, the dairy industries are among the least concentrated food processing industries. Table 1 also indicates that concentration has generally been static or slightly decreasing for nearly all dairy product categories between the years 1967 and 1982. By IO standards, this tends to be phenomenal given the dramatic reduction in the number of dairy firms in the industry and the static market growth through 1982 for dairy products. Most past IO studies show that concentration increases in industries with slow growth and declining numbers.

One possible explanation for the relatively low economic concentration in the dairy industries is the fact that most dairy products are standardized products. Standardization has been reinforced by generic advertising activities of the dairy industry. The cheese category provides an example of why product differentiation is such an important structural variable. In 1982 the Bureau of Census calculated concentration ratios for natural cheese (except cottage cheese) and processed cheese and related products. The 1982 CR-4 for natural cheese was 31 but it was 64 for processed cheese. Processed cheeses are value-added products which have had brand support over the years.

There are other reasons why the 1982 Bureau of Census CR-4's may be misleading. The numbers do not capture the growth in dairy product categories (13, p. 107). In 1984 that number nearly doubled to 806 and by 1987 there were 1132 new dairy product introductions. Much of this activity was generated in the brand-oriented product categories such as yogurt, frozen novelties, etc.

Merger and acquisition activity is perhaps the greatest challenge to Table 1. The U.S. Department of Agriculture estimates that in 1985, there were 20 dairy processing mergers (13, p. 21). In 1986, there were 9 and during the first half of 1987 there were 12. In 1986, two of the seven leading firms making acquisitions in all of the food industry were dairy companies; Kraft and Borden. Kraft and Dean Foods Company made that list in 1985. Granted not all of their acquisitions were dairy processing firms but some, like the Borden acquisition of Beatrice fluid milk operations, were quite large. The 1987 Census of Manufacturing will certainly reflect the probable increases in concentration due to this merger and acquisition activity.

Another reason that the statistics in Table 1 may under estimate the degree of concentration in the dairy sector is that many dairy markets are local or occupy market niches. This is especially true of fluid milk markets. So although the four largest firms in the U.S. in 1982 only controlled 15% of the fluid milk sales, in specific market areas the top four firms

may control as much as 90% of the sales. The realigning of plant ownership and control as the result of mergers and acquisitions, bankruptcies, and divestitures is still not complete. However, all indications seem to point to significant local and regional fluid market concentration. A comprehensive look at the economic power concentration in local fluid markets is a high priority. A related phenomenon is that concentration might be much higher in specific market niches. For example, mozzarella cheese may be processed by many processors, but relatively few dominate the fast food pizza market. Or examine the yogurt market where a recent trade publication estimates that the top three yogurt marketers sold 60.7% of the industry output (4).

We do not have an accurate picture of dairy industry concentration. Eventhough the national markets look competitive many local markets and niche markets exhibit substantial market power. Better estimates must be developed.

Industry Vertical Integration

Vertical integration has always been a part of the industry. Producer-handlers, "jug stores", etc. are examples of forward integration. However, backward integration into fluid milk processing by retail food chains has been the most important form of vertical integration. The largest food retail chains had sufficient volume to justify building their own fluid milk processing plants. The generic nature of fluid milk, homogenization and the one-way package permitted food chain integration.

By integrating backwards, food chains combine two profit centers (the profits from selling the retail item and the profit from processing a product) into one operation. When integrating chains were able to price their private label milk at substantially lower prices than their competitors, other retailers were forced to establish private label relationships with nearby processors.

The leveraged buyout craze sweeping the food retailing industry and the Jewell experience with Hillfarm Dairy have dramatically altered the vertical integration situation. Safeway's sale of dairy plants around the country and the divestiture of the Southland dairy operations are two notable examples. Only the Kroger company currently maintains a commitment to fluid milk processing.

Conglomerateness

The other structural characteristics of significance to the dairy processing sector is its degree of conglomerateness. A conglomerate is a multiple-product, multiple-market firm. The degree of conglomerate control within an industry is important because (among other things) it dilutes the power of any particular commodity within the hierarchy and the decision making processes in the conglomerate. Table 2 illustrates a few selected examples of the importance of dairy products in major well-known conglomerate food firms. These firms process brand name products known to most Americans. They are managed by brand managers with little or no understanding of milk or its production-promotion system. The situation becomes worse if conglomerate managers are finance-oriented ratio-robots. For example, would a Borden's of old be marketing substitute cheese?

TABLE 2. *Selected food manufacturers and their relative sales in dairy and dairy related products 1987.*

Firm	Year	Total Sales	Estimated Dairy Sales	Percent Dairy
		(million dollars)		
Kraft, Inc.	1987	$9,876	$4,000	40.5
Borden, Inc.	1987	6,514	2,402	36.9
John Labatt, Ltd.	1987	4,150	900	21.7
Nestle, S.A.	1987	18,211	3,260	17.9
General Mills	1987	5,189	200	3.8
Pillsbury	1987	6,128	210	3.5
Dean Foods	1987	1,435	958	66.8

Souce: Estimates are made by the author from Corporate Annual Reports, Financial Newsletters and Dairy Trade Publications.

The Structure of Processors Markets; Strategic Distribution Channels

One of the key determinants of the market environment for dairy processors is the organization and operation of its customer (as opposed to its consumer) base. A recent addition to IO theory is the concept of strategic groups. Strategic groups are markets organized along the lines of the characteristics of the purchases of the firms within definable distribution channels (2). For the dairy industry, three strategic market channels are critical. They include the retail foodstore channel, the foodservice channel and the ingredient market channel. Within each of these, subgroups can be important for specific industries like dairy. The important foodstore subgroups are the brand product segment and the retailer-private label product segment. Food service market channels have traditionally been divided between commercial and non-commercial outlets. The ingredient market is sometimes called the producer goods segment. It includes those firms which purchase food components to manufacturer final products for either the retail or foodservice markets.

Much of the discussion which follows is drawn from observations and hypotheses generated by the author. Many of these observations could be empirically documented but have not been in order to keep the paper in bounds. The discussion takes place within the context of Figure 1. Basic conditions such as business attitudes, the role of technology, changes in power relationships, growth in the size of the overall market, etc. are explored. This discussion sets in motion the dynamics sweeping the dairy industries.

Changes in Foodstore Segment

Figure 2 provides an overview of the foodstore segment of the U.S. food system. Often a distinction is made between chain stores and independents. For this paper, both are considered together. The recent merger wave among full-time general wholesalers has essentially tied many independents into procurement patterns similar to integrated chains. Also, in spite of the press accounts, specialty stores, like dairy still only make up about 6% of food store sales.

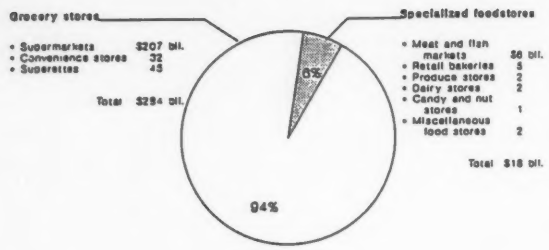

Figure 2. *Foodstore sales by sector, 1986.*

Finance Driven Structural Change

As with much of the rest of the U.S. economy, financial deregulation and its resulting creation of new financial instruments has forced the food retailing industry away from its traditional management roots and into the world of high finance suspense. Food retailing has historically been a community-based industry. Foodstore management came up through the ranks. The wave of mergers and acquisitions have affected the food retailing industry. American stores all have had some variation of finance-driven leverage buyout (LBO) activity. The characteristic of LBO's and high finance gamesmanship necessary to finance them is to force the management of the food retailing sector away from retail operations and toward very short term performance measures. Even those firms not involved in LBO's have been affected as firms like Kroger look over its shoulders toward hostile takeovers. The result of this has been a churning of food retailing assets as merged, bought-out and leveraged concerns sell off and reposition assets. Often the manufacturing operations, i.e. milk operations of the merged or bought out entity are some of the first assets to be sold off to pay for the merger and buy out.

When all the smoke clears, the U.S. foodstore market will be dominated by many local market situations characterized by very high market concentration levels. The result will be that the sales representatives of food processors and manufacturers will have many fewer sales calls to make. Those sales calls will be decidedly less comfortable than in the past.

Retailer-Manufacturer Interrelationships

The kind of economic power gained through consolidation across market areas affects the competition between foodstore competitors across and within markets. But another form of concentration of economic power is taking place. Retailers or their wholesaler representatives are rapidly gaining power in their procurement relationships with suppliers (5). A useful way to think about a supermarket is to think of it as two squares. The inner square comprises the center sections of the grocery store and is where the major interaction between food retailers and brand manufacturers takes place. Dry grocery, frozen food and HBA manufacturers battle each other and retailer brands for a static or declining linear footage. Along the edges of the larger square representing the store itself are the periphery departments; meat, produce, dairy, bakery, deli, seafood, etc. Generally those periphery departments, are under the direct control of the retailer. Manufacturer brands are not usually represented in this retail shelf space.

Today, a recent estimate indicates that approximately 50% of a stores sales are in the grocery department and 50% of the sales are in the periphery departments (10, p. 2H). Increasingly, the grocery shelf space has become exceedingly competitive. The interbrand competition is fought via new product introductions many of which are product or line extensions. In 1983, an estimated 5956 new products were introduced. By 1987 that number had risen to 10, 182 (13, p. 107). The power struggle raging between retailers and manufacturers is visible to the outside world as the controversy about "slot charges" and "street money" become trade press headlines. The increasing use of calendar marketing agreements (CMA's) and shelf-space "rental" fees are other indications of increasing retail dominance over food manufacturers. Direct product profitability (DPP) programs will be the weapons of retailer choice in the coming years.

A direct consequence of retailer power is the desire by food retailers to turn consumer directed food advertising and couponing activity more toward interbrand price/promotion competition and retailer oriented push promotion activity. The retailer sector will do whatever it can to divert manufacturers' promotion dollars away from strategic promotion and turn them toward tactical promotion.

Therefore, dealing with fewer and more economically powerful retailers; managing with more sophisticated computer enhanced information systems; and prodded by short-term, finance-driven, non-retail oriented management will mean an inhospitable environment for suppliers in need of consumer access via food stores. The largest manufacturers have learned to deal with power with a bifold strategy. They only strive for first or second position brands and they diversify into other strategic market channels.

Intensified Refrigerated Case Competition

There is a significant increased interest in the refrigerated (dairy case) shelf space in the food store segment. This trend is driven by two forces. First, there is a demographic shift toward more fresh-oriented food as health consciousness and convenience driven consumers look for new products. Demographic growth areas always attract tremendous amounts of interest from large conglomerate food marketers. Second, the war in the grocery isles has spilled over into the dairy case. Food marketing giants looking for places to apply their marketing skills honed in the package goods industries have settled in on the dairy case. The dairy case now has all the big players including Coca Cola (Minutemaid), Proctor and Gamble (Citrus Hill), General Mills (Yoplait), in addition to the well-known firms like Kraft, Borden, Beatrice, etc.

A few statistics, highlight the intensification of the dairy case competition. Between 1966 and 1987, the typical supermarket doubled in size. However, in 1966 the typical dairy case was 56 linear feet. Today it runs 60 linear feet. So at a time of heightened interest in the dairy case, the available space has not grown proportionally. This has significant im-

plications for many of the industry's medium sized dairy processors and new entrants wanting to cash in on the growing dairy industry demands.

Food Store and Food Service Competition

A final trend in the food store strategic group is the recent attempts by food retailers to regain ground lost to the food service industry over the past ten years. The service oriented activities within the periphery of the supermarket, full service, deli's, cheese centers, fresh orange juice squeezing, take-out meals, salad bars, etc. are all attempts by the food retailing industry to deal with competition from the food service sector. The reason is obvious when one looks at the latest USDA projection on grocery store sales. In 1987, USDA estimates the real growth in grocery stores sales to be zero.

The periphery departments for the most part use basic standardized commodity ingredients and produce a non-branded or retailer identified product. Therefore, food manufacturers attempting to escape the center square of interbrand and private label competition find it difficult to gain access to these type of departments. Perhaps Kraft's recent acquisition of 19 food service wholesalers positions it to effectively compete in this food store arena.

Changes In The Food Service Segment

Food Service Subsegments

Some industry observers are postulating that the growth in food service has essentially ended. The argument goes that growth has ended because the basic demographic trend driving it has slowed significantly. The assimilation of many women into the work force resulted in a growth for food service activities. It appears that the trend has stabilized. Overall the food service sector (see Figure 3) may be over built and currently may have significant over capacity.

Many large food marketers who had been integrated in the food service segment are considering backing out of the segment. The number of commercial eating and drinking places, in the U.S. peaked at 351,935 in 1983 and by 1985 (the latest statistics available) fell to 333, 994 (13, p 71). In constant dollars, the value added per full-time equivalent employee in eating and drinking places has stopped rising (13, p. 100). How much longer will food service growth continue to dominate food firm strategic planning?

Non-commercial food service sector is often overlooked in discussions about food service. As shown in Figure 3, it now comprises a $46 billion market and makes up 26% of segments sales. Demographics suggest that this will continue to grow and probably capture an increasing proportion of food service sales. Servicing this portion of the food service strategic group has been unglamorous and it is dominated by specification procurement of commodity type products. The dairy sector has had extensive involvement in the non-commercial market. However, competitive forces may challenge the dairy industry.

Food Service - Food Store Competition Revisited

If slow growth and over-capacity force food service competition, what form will that competition take? The current food marketing fad, "fresh prepared foods" is one competitive consequence. This trend is supposedly driven by demographic rebound caused by the women's ascension into the work force. "Cocooning" is the food marketer's new buzzword. The logic goes that All-American yuppie couples after a hard week of McDonald's breakfasts, salad bar lunch, and airline dinners least desire is to get dressed up on Saturday night and go out for a restaurant meal. Therefore, they will use their discretionary income to purchase a high quality professionally prepared meal for consumption in their home with their family in front of their VCR and fireplace. The home delivered and pick up fresh prepared pizza market has been propelled by the "cocooning" phenomenon. How long the phenomenon will continue is questionable. But is has established a significant interstrategic group marketing battle between food retailers and commercial food operators.

Commercial and Non-Commercial Food Service Competition

The second manifestation of intensified competition and over building in the commercial food sector are the recent moves by large commercial food service entities into the non-commercial sector. For example, the Michigan State University Faculty Club now has its own private, unadvertised, unmarked Burger King. McDonald Corporation recently announced its first units in hospitals. Proctor and Gamble sees the need for children to substitute calcium fortified orange juice for milk in the school lunch program. Again, perhaps Kraft's recent moves are well planned.

The demographics of the U.S. population, the lack of profitable expansion in commercial food service and the power of the very largest food manufacturers and food service distributors could likely make the non-commercial food service market the next competitive battleground.

The Mysterious Ingredient Market Strategic Group

What is the Ingredient Market?

The ingredient market is dominated by firms who purchase intermediate or what economists often call producer goods to further process into final consumer products. Little is known about these firms by outsiders (professors, consult-

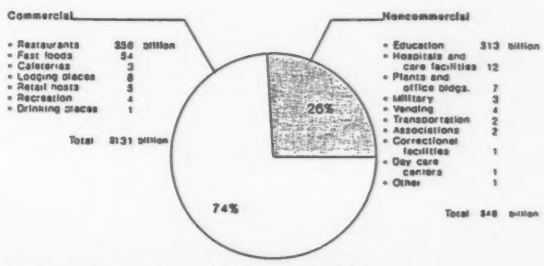

Figure 3. *Foodservice sales by sector, 1986.*

ants, etc.) because they do not purchase a lot of advertising, do not directly interface with final consumers or generate a lot of publicity outside of their own trade shows.

This strategic group has grown rapidly for several reasons. First, many major food manufacturers have tried to isolate themselves from commodity markets. The most direct way is to buy initially processed products from ingredient suppliers (6). Second, food service expansion increased ingredient demand as food service buyers particularly those in the fast food segment demanded custom made products for their operations.

Movement toward more ingredient buying by food manufacturers and food service suppliers will probably grow. Ingredient buying isolates the firms from commodity uncertainty by letting the ingredient supplier firms eliminate worries about adjusting market demands to available supplies. Purchasing ingredients frees manufacturers and food service suppliers from inventory responsibility. Many agriculture based commodities are produced on a stock basis and must be supplied to the marketing system out of stored commodities. This exposes firms to price and inventory risk. Finally, ingredient purchases give buyers greater flexibility in dealing with the commodity price and market demand changes. Simply put, purchasing ingredients is often the most cost effective and least risky way of producing standardized consumer and food service products.

Ingredients Are Changing Their Image

Historically, the ingredient market has been closely associated with the 'additive' market dealing with coloring, stabilizers, spices, preservatives, etc. The impending biotech breakthrough such as Nutra-Sweet's Simplesse and Proctor and Gamble's Olestra may remove the last impediment to further use of ingredients in food product design and fabrication. "Additives" have had a pejorative impact on food demand. Increasing additives will be viewed as positive if the additives reduce fat, cholesterol, calories or add calcium.

The dairy ingredients market has been largely dominated by the large fully integrated milk marketing cooperatives and multinational dairy firms such as Borden and Nestle. The rapid growth of edible whey and whey proteins suggests that the dairy industry has been a critical player in the growing ingredient market. However, further empirical research is needed to fully understand this strategic group.

Implications For The U.S. Dairy Processing Sector

In review, the paper attempted to identify an analytical framework (Figure 1) to bring order to the myriad of forces at work in dairy markets. Using this framework, the following are some likely structural and behavioral responses of various segments of the dairy processing industry within the next five years.

Fluid Milk Processing

The fluid milk processing sector with its associated soft product manufacturing capacity will continue the trend it has been on for the last 25 years. The recent consolidations have already made large formidable market share leaders in many important U.S. fluid milk markets. More mergers are expected but those mergers will probably still continue to be driven by financial considerations. Current profit levels in the industry do not appear to justify purchases by big money outsiders.

The Presidential election will have little effect on the current lack of antitrust enforcement. Changes to the Federal Court system brought about by eight years of Republican judicial appointments will mean fewer antitrust cases will be successful. Therefore, future fluid milk mergers will likely be among those firms already in the fluid milk business. Significant increases in economic power in local markets could continue.

The intensification of dairy case shelf space competition combined with increased economic concentration spells serious trouble for regional fluid milk processors in the U.S. Many have survived on the profits from the slower moving soft-products (chip dips, sour cream, etc.) and by gaining access to alternative distribution channels. As the large brand manufacturers fight for shelf space for yogurt, "light" sour creams, etc. and P & G adds more orange juice products, the only hope for many of these specialized fluid processors is to go to alternative distribution channels. Recall Figure 3. The alternative markets like convenience stores, dairy stores, gas stations are rather limited and expensive to service. However, a few firms many be able to survive using this strategy.

The combination of leveraged buyouts and the Hillfarm plant disaster have shaken the resolve of many of the integrated food chains to maintain their vertical integration into fluid milk operations. However, there is no change in the pattern whereby retail chains desire captive fluid milk suppliers within each of their geographic market regions. The Jewel-Hillfarm plant fiasco has however convinced most chains that they should adopt a strategy of always having backup suppliers available. Therefore, there may be more opportunities for very large fluid milk processors to gain access to grocery store chains. This can happen only if they are capable of handling the volume, service, and merchandising needs of increasingly powerful food retailers.

In the longer run the adoption of reconstituted milk may allow significant product differentiation to develop in fluid milk markets. Standardization and generic advertising have held down brand power in the fluid milk business. Current and past debates of the reconstitution issue have not included discussion of the long term market structural consequences of allowing the alteration of the identity of fluid milk. These consequences may be as important as the redistributive aspects of reconstitution.

The fluid milk products' problems within the commercial food service sector are well known and documented. The dairy industry has done fairly well in the non-commercial food service sector. In fact, many of our smaller fluid milk processors survive by servicing these accounts. The recent orange juice case in a northern New Jersey school district may be only the opening round in a coming intense

battle for the dairy industries' access to the non-commercial Foodservice business.

Cheese

Perhaps nowhere will or is structural change occurring as rapidly as it is in the cheese processing sector. Branded, packaged and value-added cheeses in the food retailing strategic group will continue to be dominated by large brand companies. An important structural question will be whether these brand manufacturers continue their historic position of being integrated backwards into milk procurement. Many other brand manufacturers have already gone to the ingredient market to eliminate commodity uncertainty. Given the finance-driven decision making of modern conglomerates, this hitherto unimaginable development might take place. What will happen to Beatrice's cheese division? Will the "bean counters" gain control of Kraft displacing the old line plant manager power structure?

The private label sector of the food store strategic group is currently handled by large specialized cheese processors some of which are integrated marketing cooperatives. There do not appear to be any significant forces pushing change in that segment of the cheese business.

The rapid growth in cheese consumption has attracted the retailers to featuring cheese at the expense of other protein items within the grocery store. The modern food grocery store may have cheese in the dairy case, in the deli case, in the meat case and in a cheese center. Kraft is perhaps the only firm positioned to sell in all of those locations. Also, given the increasing power of retailers over suppliers, there is a real danger that trade oriented promotion activities by dairy producers will be changed from strategic promotion into tactical promotion. This would allow retailers use of producer dollars to lower their procurement prices for cheese. Retailer, trade oriented promotion schemes for cheese must be fully explored in light of the dynamic structural bargaining power changes in the foodstore segment. Ill-conceived trade promotion can lower producer cheese returns overtime.

The ingredient cheese market has been informed and shaped by the pizza market and the needs of foodservice manufacturers. The concentration of sales to the pizza market has become significant. Understanding the specialized needs of ingredient product buyers and having the money for specialized capital means that many cheese manufacturers are foreclosed from the rapidly growing portion of the dairy sector.

The remaining part of the cheese business is a producer good-ingredient segment type of business. The plant technologies requiring joint production of edible whey are now pervasive and will become even more so. As the ingredient market continues to gain a greater proportion of the demand for dairy based products, the fully integrated cheese-whey processor will survive. The structural fall-out on Northeast and Wisconsin cheese processing firms has yet to happen. However, predicting the demise of the corner cheese factory in Wisconsin may be as difficult as predicting the demise of grade B milk in Wisconsin.

Butter

Nothing much will happen to the structure of the butter market in either the food service or food retailing sectors. Packaging innovations for the foodservice market and the butter blends in the retail market were judged acceptable activity. There would be no reason to expect significant change in the butter market except one. Butter may be an endangered product unless research and development can neutralize the negative characteristics of butter products. If they are neutralized the basic flavor of butterfat is so positive that it will be the preferred ingredient for all market segments. Without a change butter will continue in its same unexciting existence.

Ice Cream

The excitement of the super premiums and novelty growth has about run its course. Significant growth in ice cream will require the same technological breakthrough required for butter. The new entrepreneurial firms entrance in the ice cream business will continue to get a lot more publicity than sales. Ice cream sales will again be dominated by the existing large scale dairy processors who now control the business.

The rapid growth in frozen yogurt outlets could have significant impacts on ice cream sales. Discussions with one of Michigan's leading ice cream shop operators verified empirically that their ice cream sales were dramatically lower in locations with competing frozen yogurt outlets. A major food retailer in Michigan, in an attempt to capture sales from the foodservice strategic group plans to put frozen yogurt dispensers in all of their retail outlets. Although both ice cream and frozen yogurt are ingredient products, frozen yogurt is much more so. Frozen yogurt ingredients are going to Michigan from California. This is another indication of increasing importance of ingredient suppliers in the structure of the dairy industry.

Cultured Products

Growth in the cultured products will continue to be dominated by the very large brand food processors now dominating many of those individual product categories. Reformulated cultured and new dairy desserts have great potential in the U.S. Until a year ago, U.S. Market entry by European dairy processors seemed likely. The combination of the turnaround in the value of the dollar and the implementation of quota programs in the EC have quelled entry activity for the short run.

Any European entry into the U.S. cultured product markets, will likely be done via joint ventures with dominant marketing giants here in the U.S., i.e., the Yoplait model.

Condensed and Evaporated Milk

These are essentially static and old line milk products which will incur no more significant structural changes in their life time. Any movement toward reconstituted milk using powdered milk could reawaken some segments of these firms. Those powdered manufacturers who have the capacity to produce a full line of customer-specification

products will prosper with growth of the ingredient market. The large integrated producer cooperatives may continue to dominate this market.

Summary and Conclusions

The combined effect of financial deregulation and non-existent antitrust enforcement have resulted in the greatest merger, acquisition and divestiture cycle in U.S. economic history. The U.S. dairy processing and manufacturing industries have not escaped this structural upheaval. This merger mania has a Dr. Jekyll and Mr. Hyde character about it. Much of the activity was generated by "financial churning" and is epitomized by the actions surrounding the Beatrice Company. Financial brokers were using, and are using companies to churn trading profits quickly without having to generate wealth the old fashioned way--through long-term growth and productivity improvement. The flip side of the merger and acquisition activity is to allow powerful industry units to consolidate and enhance their relative market positions in their respective industries. The euphemistic phrase heard these days are that the large corporations are "returning to their roots". The consequences of the tremendous concentration of economic power have yet to be visited upon U.S. consumers and the U.S. economy in general.

The implications are not clear however. The systematic application of economic power for long-term financial reward requires that the custodians of the industrial power understand the industries they are in and have a long enough perspective and planning horizon to harvest the rewards of market power. The current trend whereby the control of our industrial might by the so-called "bean counters" or finance oriented executives, may prevent economic power consolidation from being actualized. It is becoming increasingly clear that the finance oriented modern captains of industry have little understanding of what really goes on during sales calls or on the shop floors. The dairy industry and future of the processing sector is currently tied up within this dilemma. For example, will the Borden's dairy people be able to operate Borden as a long-term dairy company or as part of a financial conglomerate? What will happen to Beatrice's cheese operations? Will the next round of finance driven shenanigans eliminate Kroger's commitment to dairy processing? These are the relevant questions to understanding whether we will continue to have a dairy industry as we know it. Will dairy products retain their identity or become melted into anonymous ratios at some conglomerate's headquarters?

Perhaps the other significant trend is the rapid rise in the ingredient market nature of dairying products. As more and more firms go to designing and fabricating foods, the dairy component of those foods becomes diluted and looses its identity. As this happens the consequences can be significant. The food manufacturer of the next decade may be able to switch protein sources at the drop of a hat. How to maintain dairy's presence in a system evolving in this direction will be a significant challenge for dairy promotion organizations.

Finally, the rising power of major food retail and food service buyers makes factionalism within dairy promotion extremely dangerous. Firms with procurement power will always attempt to play one supplier off against another. They will turn promotion activities from strategic market building to tactical price-oriented activities. As dairy promotions necessarily respond to rising importance in the ingredient and food service markets, knowledge of the existence, and use of economic procurement power is critical. Without an understanding of real world procurement power, dairy promotion activities might have analogous results to the naive country cousin's first visit to the big city.

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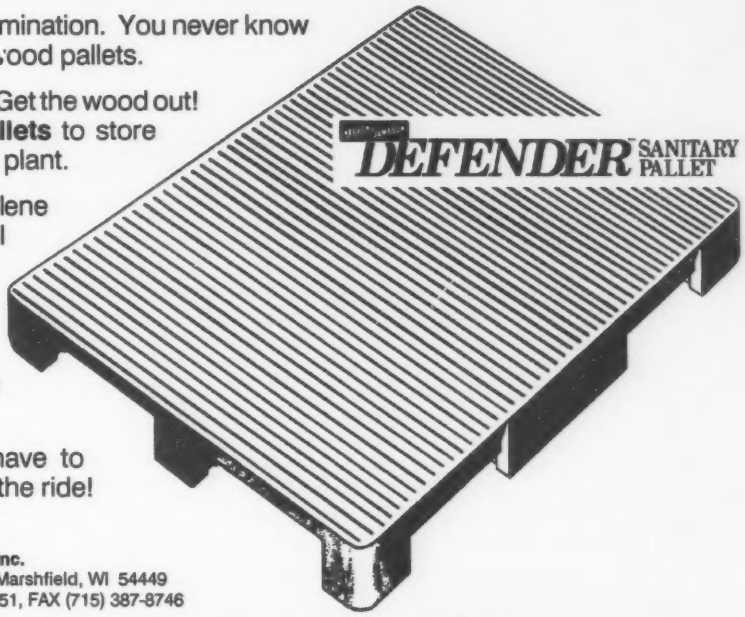

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Update on Human Foodborne Disease

by

Marissa Miller, DVM, MPH

Human foodborne disease occurs in monumental numbers, costs billions of dollars, and poses a chronic health risk to its victims. Animals and animal products can harbor many of the potentially pathogenic organisms implicated in human foodborne disease outbreaks and thus serve as sources for human infection. Animal feed may play a role in the movement of organisms from animals to man.

Foodborne infections/poisonings rank second only to the common cold as the most frequent cause of short term illness in the United States (Zaki 1977). Foodborne disease, both from its acute illness standpoint and chronic sequellae, is a significant public health concern. It is estimated that 24 million to 81 million cases of foodborne diarrheas and subsequent person-to-person transfer occur yearly in the U.S. (Archer 1985).

Each year there are millions of cases of meat and poultry-borne disease. There are probably over 5 million cases of disease and greater than 9000 deaths yearly attributable to the following meat/poultry pathogens: Salmonella, Campylobacter, *Clostridium perfringens, Yersinia enterocolitica, Escherichia coli, Toxoplasma gondii, and Listeria monocytogenes*. It is estimated that 1.8 million cases of human disease are a result of Salmonella and Campylobacter contamination alone. Salmonellosis is the only foodborne disease that is currently considered a notifiable disease to the Centers for Disease Control. Salmonella cases rose from 11 per 100,000 in 1971 to over 27 per 100,000 in 1985 (Menning 1988).

The scope of the foodborne diarrheal problem in the U.S. is significant in terms of numbers of people affected and the actual clinical disease and its sequellae. Such factors as the virulence of the agent and predisposing characteristics of the host such as age, health, and immunocompetence influence the expression of the disease. Not all infections result in diarrhea as a symptom. For example, Yersiniosis may present with severe abdominal cramps and no diarrhea. The majority of foodborne illnesses result in mild disease of short duration; however, more is being learned about the long-term sequellae of these diseases.

Many of the organisms now recognized as responsible for human foodborne disease outbreaks have been known to cause disease in animals for many years. Salmonella were isolated from animals in 1884, Campylobacter (formerly considered a Vibrio) have been recognized as disease agents in animals since the 1890's. listeriosis in sheep was recognized and described in 1925 (Menning 1988). The association of these animal pathogens to man was slower to occur. Campylobacter was identified as a significant human pathogens in the mid 1970's and is now thought responsible for the majority of the gastroenteritis cases in the U.S. and the world (Doyle 1985). Listeria is also emerging as a source of human disease in the 1980's (Barza 1985). *E. coli* historically, was believed to be a non-pathogenic indicator organism of fecal contamination, but now four strains and at least four mechanisms of disease production have been identified. *Yersinia enterocolitica* and *Acromonas hydrophila* are also being grouped with animal based foodborne disease. These entities that are now recognized as causing significant human disease most often originate from healthy or subclinically infected animals, but can also cause significant animal disease as is the case with Salmonella, which remains a serious problem in veterinary practice (Wray 1985).

The source of pathogens in the human food supply can be from raw foods harboring pathogenic organisms, contamination during processing, and mishandling of foods during preparation and storage (Beckers 1987). Contaminated feed ingredients are widely suspected as a source of animal infection and colonization of the digestive tract, which can lead to contamination of meat and poultry for human consumption and ultimately a source of infection for man. In this case, transmission is from animal feeds to poultry and other farm animals and then to man in the form of animal carcasses, milk, eggs and egg products. Animals become infected or become carriers of pathogenic organisms through consumption of contaminated feeds; environmental exposure to organisms in water, sewage, soil, dust, and air; or through animal-to-animal transmission, particularly in stress related situations.

The bacteria of most concern today in human foodborne infections that have a significant link to animals include: Campylobacter, Listeria, Yersinia, Escherichia, and Salmonella. Clostridium and Staphylococcus are also prevalent causes of food related disease (poisonings) but are almost always a result of improperly processed, handled, or cooked food. Vibrio species including cholera, parahaemolyticus, and vulnificus cause significant human foodborne disease. These organisms are isolated from coastal waters and seafood and do not appear at this time to have a link to man through domestic animals or animal feeds.

Livestock and poultry are believed to become colonized with Salmonella through the consumption of contaminated feeds. It is suspected that livestock infection with other organisms may also occur through the contaminated feed supply. The CVM Animal Feed Safety Branch is launching a Microbiological Contaminants in Animal Feed Program to investigate and address this problem. A feeds survey will be undertaken in 1989 to supply current baseline information on the prevalence of bacterial contaminants in animal feeds. Since pet foods are also considered to contain potential bacterial contamination that could pose a public health threat to man and his companion animals, pet food will also fall with the developing animal feeds program.

FDA Veterinarian Nov-Dec 1988.

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The Scientists Tell Me ...

Glutaraldehyde Tested as an Alternative Sanitizer for Egg Disinfectant

by Marilyn Brown
TAES Science Writer

Each year, the poultry industry processes about 7.5 billion hatching eggs through incubation facilities. Chick producers rely primarily on formaldehyde to sanitize the eggs, but concern over toxicity to workers may soon remove the chemical from use as a hatching egg disinfectant. In anticipation, poultry industry researchers are looking for alternative sanitizers that would be both safe and effective.

Poultry scientists with the Texas Agricultural Experiment Station have found that nature's own defense system, boosted by cleanliness at the breeder farm and during storage and transfer, may preclude the need for strong chemical bactericides.

Poultry marketing and product technologist F.A. Gardner and his colleagues conducted a series of experiments evaluating the potential of glutaraldehyde and an ammonium compound as alternative sanitizers. Glutaraldehyde and the quartenary ammonium compound were applied as a dip and compared to formaldehyde fumigation.

In Trial 1, about 2,500 hatching eggs were obtained and submerged for 60 seconds in an aqueous inoculation solution containing 5 million microorganisms per mil. The inoculating solution was prepared from microorganisms that had been cultured from samples obtained from a commercial poultry hatchery.

Based on the results of the original trial, a modified experimental design utilizing 2,875 hatching eggs was initiated for Trial 2. The inoculum was diluted to 2.5 million microorganisms per mil and a non-inoculated control group was added.

The research found that both glutaraldehyde and formaldehyde treatments of eggs at the farm level produced an increase in embryological damage, as demonstrated by embryo mortality during the first 3 weeks of incubation. Only minor embryological damage was associated with sanitizing treatments when they were imposed at the hatchery level.

The bacterial content of the eggs were essentially unaffected by the sanitizing treatments. Natural defenses within the egg reduced bacterial numbers during the 5 days of storage preceding incubation. However, at transfer, bacterial numbers in the eggs from each treatment group were either at levels of approximately 100,000 per egg or higher.

"It appears that each of the treatments used in Trial 1 produced embryological damage and were ineffective in controlling bacterial numbers," Gardner says.

In Trial 2, the use of glutaraldehyde produced a significant decrease in the percent hatch of fertile eggs. Formaldehyde gas or quaternary ammonium compound were effective in keeping bacterial numbers in the egg contents at relatively low levels during the first 15 days of incubation.

However, at egg transfer (18 days of incubation), there were no significant beneficial microbiological effects that could be associated with any of the sanitizers used, Gardner says. Only the non-inoculated, control eggs maintained a relatively low bacterial count through the first 18 days of incubation.

"Results obtained in these two trials indicate that a hatching egg sanitizing program can only be effective if it is applied at the breeder farm level," Gardner says. "Additionally, in almost all cases, the natural defenses of the shell egg (pH, protein effects, etc.) are extremely effective in controlling bacterial proliferation in the eggs."

The experiment suggests that sanitation efforts in hatching programs should be directed to overall sanitation at the production facility, during egg transit and storage, and during the normal incubation periods, rather than complete reliance on an anti-bacterial treatment.

"Recognition of the need for a sound sanitation program for the production of hatching eggs appears to be an important component of effective sanitation protocol," Gardner explains. "Overall, only minor effects on egg microbiology or hatch of fertile eggs were associated with the sanitizing programs evaluated. Additionally, in almost all cases, the sanitation programs increased the incidence of embryological mortality during incubation.

"It is evident from the experiment that a massive buildup in microbiological contamination of the egg contents occurs at the time of transfer following 18 days of incubation," the scientist says. "To what degree this microbiological buildup contaminates chicks and influences their subsequent performance remains to be determined."

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News

Robert Marshall, food scientist at the University of Missouri-Columbia, has been appointed Arbuckle Professor and leader of the newly established laboratory for teaching and research on ice cream and frozen desserts. "We plan to develop new ice cream products and improve some old ones," Marshall said.

Mizzou Names "Ice Cream Man"

Robert Marshall can now claim the title of "Mizzou's ice cream man."

The nationally-known food scientist has been appointed Arbuckle Professor and leader of the University of Missouri-Columbia's newly established laboratory for teaching and research on ice cream and frozen desserts.

The laboratory is partially supported by the W.S. Arbuckle Endowment established in honor of the 1940 Mizzou graduate who gained world-wide recognition as an ice cream authority.

Marshall has taught and experimented with dairy foods for 28 years.

"We plan to develop new ice cream products and improve on some old ones," Marshall said. "We want to formulate frozen desserts to meet consumers' nutritional needs.

"And we plan to open a dairy store in the University's Eckles Hall this spring, in the tradition of the one we had here from 1920 to 1972. At the new store -- Buck's Ice Cream Shop -- we'll give visitors a chance to taste some of our successes."

Marshall has been president of the American Dairy Science Association and has received teaching awards from the Milk Industry Foundation, AMOCO and the International Association of Milk, Food and Environmental Sanitarians, Inc. He has received research awards from Dairy Research Incorporated and Gamma Sigma Delta.

Advisers to the Arbuckle Laboratory include representatives of the International Ice Cream Association, Missouri Ice Cream and Milk Institute, Baskin-Robbins, Mid-American Dairyman, Inc., the Kroger Co., Midland United Dairy Industries Association, Beck Flavors, Germantown Manufacturing Co., Technology Application and Management Co., Pevely Dairy Co., and Mrs. Wendell Arbuckle.

1989 Food Processing Waste Conference

The 1989 Food Processing Waste Conference is the third in a series of annual forums organized to encourage the exchange of information concerning the management of wastes generated by the food processing industry. The purpose of the conference is to promote the understanding and development of new research on food processing waste treatment, as well as process design, operating strategies, and regulatory issues affecting the industry. Sessions will address the treatment and utilization of food processing wastes through methods such as anaerobic/aerobic treatment, physical-chemical treatment, and nutrient recovery. Other topics will include plant case studies and discussion of legal and regulatory issues. Concurrent with the conference will be a product and service exhibition by companies that have an interest in waste management for the food processing industry.

The Conference will be held November 6-8, 1989 at the Omni International Hotel, downtown Atlanta, Georgia. It is sponsored by the Environment, Health and Safety Division, Georgia Tech Research Institute. For more information, contact: Ed Valentine or Chuck Ross, Georgia Tech Research Institute, Economic Development Laboratory, Environmental, Health and Safety Division, O'Keefe Building, Atlanta, GA 30332 (404) 894-3412.

Henkel Chemical Services Develops Sanitation Validation

Government agencies are becoming more concerned about validating sanitation procedures in the processing of dairy products. Henkel Chemical Services Division (CSD) has developed a new system for "sanitation validation" known as the LM 3000. This system is a C.I.P. monitoring and controlling system that monitors all the functions of a C.I.P. system, and compares the actual running program to a known set of validated cleaning parameters. Because of the strong interest this system generated with the F.D.A.'s Milk Safety Group, Henkel presented the LM 3000 at the group's regional meetings in St. Louis, MO; Baltimore, MD; and, Denver CO.

Newest Additions to the IAMFES Lending Library

The following are the newest additions to the IAMFES lending library. If you need additional information don't hesitate to contact IAMFES, PO Box 701, Ames, IA 50010 (515) 232-6699 or 1-800-525-5223, outside of Iowa.

1. Title: "100 Degrees of Doom -- The Time and Temperature Caper"
Description: A 14-minute video portraying a private eye tracking down the cause of a salmonella poisoning. Temperature control is emphasized as a key factor in preventing foodborne illness. Source: Educational Communications, Inc. 761 Fifth Ave, King of Prussia, PA 19406-1492 (215) 337-1011.

2. Title: Food Safe - Series I
Description: This series consists of four 10-minute videos:
(1) "Receiving and Storing Food Safely" -- Details for foodservice workers the procedures for performing sight inspections for the general conditions of food, including a discussion of food labeling and government approval stamps.
(2) "Foodservice Facilities and Equipment" -- Outlines the requirements for the proper cleaning and sanitizing of equipment used in food preparation areas. Describes the type of materials, design, and proper maintenance of this equipment.
(3) "Microbiology for Foodservice Workers" -- Provides a basic understanding of microorganisms which cause food spoilage and foodborne illness. This program describes bacteria, viruses, protozoa, and parasites and the conditions which support their growth.
(4) "Foodservice Housekeeping and Pest Control" -- Emphasizes cleanliness as the basis for all pest control. Viewers learn the habits and life cycles of flies, cockroaches, rats and mice. Source: Perennial Education, 930 Pitner, Evanston, IL 60202 800-521-2363.

3. Title: Food Safe - Series II
Description: A set of four 10-minute videos that present case histories of foodborne disease involving (1) *Staphylococcus aureus*, (2) *Salmonella*, (3) *Campylobacter*, and (4) *Clostridium botulinum*. Each tape demonstrates errors in preparation, holding, or serving food; describes the consequences of those actions; reviews the procedures to reveal the cause of the illness; and illustrates the correct practices in a step-by-step demonstration. These are excellent tapes to use in conjunction with hazard analysis critical control point training programs. Source: Same as number 2.

4. Title: "Safe Handwashing" (15 minutes VHS videotape)
Description: Twenty-five percent of all foodborne illnesses are traced to improper handwashing. The problem is not just that handwashing is not done, the problem is that it's not done properly. This training video demonstrates the "double wash" technique developed by Dr. O. Peter Snyder of the Hospitality Institute for Technology and Management. Dr. Snyder demonstrates the procedure while reinforcing the microbiological reasons for keeping hands clean. Source: Hospitality Institute for Technology and Management, 760 Transfer Rd., St. Paul, MN 55114 (612) 646-7077.

5. Title: "RCRA - Hazardous Waste" (19 minute videotape)
Description: This videotape explains the dangers associated with hazardous chemical handling and discusses the major hazardous waste handling requirements presented in the Resource Conservation and Recovery Act. Source: Industrial Training, Inc., 2023 Eastern Ave. SE, PO Box 7186, Grand Rapids, MI 49507 800-253-4623.

6. Title: "Asbestos Awareness" (Approx. 20 minute videotape)
Description: This videotape discusses the major types of asbestos and their current and past uses. Emphasis is given to the health risks associated with asbestos exposure and approved asbestos removal abatement techniques. Source: Same as number 5.

Professor David A.A. Mossel Nominated Distinguished Visiting Professor at University of Wisconsin-River Falls

Professor David A.A. Mossel, BM, MA, PhD, since 1972 Professor of Medical Food & Water Microbiology at The Netherlands Government University at Utrecht and since 1984 employed in the same function as Professor-Emeritus has been nominated Distinguished Visiting Professor of Food Microbiology at the University of Wisconsin at River Falls.

Dairy Laboratory Workshop

A two-week dairy laboratory workshop is scheduled for July 17-28, 1989 at Penn State University in State College, PA. The first week will include lecture and demonstration of all tests and responsibilities of quality assurance directors. However, the second week will emphasize demonstrations and practice for those wishing to be approved by regulatory agencies as laboratory analysts for the five required tests. It will be conducted by faculty, regulatory and industry quality assurance directors. A minimum of 25 persons must preregistered by May 15. Contact Sidney E. Barnard, Food Science Dept., 8 Borland Laboratory, University Park, PA 16802 or telephone (814) 863-3915 for program and details.

Food/Analyst CD-ROM

Food/Analyst CD-ROM, a PC program using the entire USDA food nutrient database (including sugar) now gives you instant access to over 80 nutrients of nearly 5000 foods. Carol Dunn of Hopkins Technology, says that any number of people, meals, and recipes can be tracked by Food/Analyst, limited only by your personal computer storage. Since the entire food/nutrient database is stored on the CD-ROM, all you need is a PC and a CD-ROM reader. Dunn says, "you can say goodbye to mainframe access, on-line charges, and incomplete data".

Food/Analyst is very friendly and has the latest in personal computer user-interfaces. It uses windows and screen choices to select and build recipes and meals. Also included are on-line help and screen graphs of U.S. RDAs based on personal characteristics. User selected nutrients can be displayed individually for each person entered, and a variety of ratios are automatically displayed, including P:M:S, Ca:P, and calorie contribution of protein, carbohydrates, fat and optionally alcohol. Food/Analyst CD-ROM is priced at $65, including instruction manual.

In Food/Analyst, you simply enter what you have eaten (or plan to eat), your favorite recipes, which can then be included in your meals, and the program then analyzes the foods by nutrient content.

Whenever you want, you can get a bar chart on your screen, showing how each day's meal(s), recipes, or a single food measure up to recommended daily allowances. You can get a full printed report of exactly how much of each nutrient was in each meal, recipe, or even a single food. If you want to know which foods are high in calcium (or any other nutrient), you can instantly get a complete sorted list.

Hopkins Technology, a CD-ROM publisher, introduced Food/Analyst CD-ROM, as the fourth in its CD-Stats series. The other HopTech CD/Stats, including Econ-Stats with eight economic databases, Consu-Stats with the 1984 Consumer Expenditure Surveys, Agri-Stats with eight agricultural databases, and Labor/Stats with nine employment and productivity databases (due out in April 89), have been especially popular with universities, libraries, and corporations.

For more information, contact: Carol Dunn, Hopkins Technology, 421 Hazel Lane, Suite 100, Hopkins, MN 55343-7117 (612) 931-9376.

Dr. Donald Clifford Kelley, D.V.M.

Dr. Donald Clifford Kelley, D.V.M., age 75 died January 15, 1989 at College Hill Nursing Center. He was born June 23, 1913 in St. John, Kansas. Dr. Kelley had been a resident of Manhattan since 1958.

Dr. Kelley was commissioned in 1936 and during W.W. II and the Korean Conflict he served with the U.S. Army Veterinary Corps. His tours of duty included KSU as Professor of Military Science and Tactics; Walter Reed Army Medical Center and Medical Field Science School, Member of Joint U.S. Military Aid Group to Greece and Veterinary Public Health in Germany. After serving with the U.S. Army for more than twenty years, Lt. Col. Kelly joined Kansas State University as an Associate Professor and retired in 1978 as a full Professor.

Honorary and Professional memberships included: Phi Kappa Phi, Gamma Sigma Delta, Sigma Xi, American Board of Veterinary Public Health, American Veterinary Medical Association, Kansas Veterinary Medical Association, Conference of Public Health Veterinarians, Association of Military Surgeons, International Association of Milk, Food and Environmental Sanitarians, Inc., and Royal Society of Health, London, England. Dr. Kelley received his D.V.M. from Kansas University in 1935 and his M.S. from Kansas State University in 1952. Dr. Kelley was a member of the First Methodist Church.

A Dr. Donald C. and Margaret M. Kelley Memorial Scholarship for Veterinary Medicine has been established at the Kansas State University Foundation. Memorial gifts may be directed through the Dean's Office, Kansas State University College of Veterinary Medicine, Manhattan, KS 66506.

Agpro and Five G Consulting Services Now Available Through Surge Dealers

Babson Bros. Co., Naperville, IL, and Agpro and Five G launched a combined marketing program effective April 1, 1989. The agreement was finalized in mid-December at meetings between D. Joe Gribble, President of Agpro, and Babson Bros. Co. President, Nicholas C. Babson.

Rick Petty, Vice President and General Manager of Agpro states, "Babson Bros. Co. has a fine reputation and a well-established network of Surge dealers serving the dairy industry. Agpro, based in Paris, Texas, has a great deal of experience in the layout and furnishing of large commercial dairy projects in the southwestern and southeastern regions of the United States. This joint effort will benefit both organizations and the customers they serve nationwide.

Custom design and engineering services for new and remodeled dairy projects will be available through Surge dealers from Five G Consulting Services, Molallo, Oregon. Five G brings 27 years of commercial dairy design experience along with support from experts in the industry, agricultural colleges, extension services and others interested in improving dairy operations."

For more information on how these services and products can help you operate more efficiently, contact your local Surge dealer or Babson Bros. Co., 1880 Country Farm Drive, Naperville, IL 60540.

MIF Responds to Greenpeace Petition: Milk Is Safe

Consumers need not alter their consumption habits because of a concern about dioxin in milk packaged in paper containers, affirmed the Milk Industry Foundation (MIF) this week. MIF was responding to a Greenpeace U.S.A. petition that asked USDA's Food and Nutrition Service to adopt an interim rule prohibiting the use of bleached paperboard milk containers in school lunch programs.

"Neither the U.S. Food and Drug Administration nor the Canadian Health and Welfare Branch recommends that consumers alter their dietary patterns," said MIF Vice President Glenn Witte. "There are no facts to back up assertions of unsafe milk."

In a February 13 statement, Greenpeace suggested that the paper industry either produce unbleached paperboard containers or switch from the currently used chlorine-based bleaching process to an oxygen-based process.

The U.S. paper industry is responding to public concerns about dioxin in bleached paperboard with a commitment to continue reducing the extremely low dioxin levels that might be formed during the bleaching process. "The paper industry's ongoing actions should eliminate all concerns about dioxin residues in paper products," said Witte.

MIF supports the process modifications that are currently underway in the paper industry. The Association does not, however, advocate using unbleached paperboard. Accomplishing a conversion from bleached to unbleached paperboard containers would take longer than modifying the bleaching process.

Dioxin as an environmental pollutant has been a subject of debate and concern for several years. Last year, the Canadian Health and Welfare Branch (the Canadian counterpart to FDA) released a study that indicated low levels of dioxin in bleached paperboard milk containers. The primary purpose of the study was to validate the sensitivity of a newly developed testing method.

This single study was conducted with no controls, and the levels indicated were lower than those at which government regulatory agencies would be concerned.

MIF is the national trade association for processors of fluid milk and milk products. The Association's activities range from legislative and regulatory advocacy to market research, education, and training. Its 200 member companies process nearly 80 percent of the fluid milk and milk products consumed in the United States.

Chicago Workshop to Discuss Food Plant Sanitation

Food processors and their employees can receive the basics in sanitation and product safety training at a workshop in the O'Hare Plaza Hotel, Chicago, May 16-17.

Conducted by the American Institute of Baking, this 2-day regional workshop will provide basic information as well as up-dating employees with the latest sanitation principles and technologies, reported William E. Pursley, vice president-sanitation.

Specific subjects covered include regulations affecting and regulating the food industry, the organization and development of sanitation programs, foreign material control, the current Good Manufacturing Practices, pest control and identification, microbiology, cleaning compounds, and sanitation management.

"Participants will also receive AIB's Basic Food Plant Sanitation Manual, and AIB's Consolidated Standards for Food Safety," Pursley added. "Each of these along with handout materials of lectures will provide excellent references and guidelines."

For further information, write to the Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502 or call (913) 537-4750 or 1-800-633-5137.

FOOD PACIFIC '90

Vancouver's domed stadium B.C. Place will be transformed into a global village, an international market and trading place when nations of the world meet August 15-18, 1990 to take part in FOOD PACIFIC '90.

FOOD PACIFIC is a biennial international trade show for the food, beverage and allied industries hosted by the Government of British Columbia in cooperation with the Government of Canada. This major exhibition, modelled after other world class trade shows in Europe, Asia and the United States, is held in Vancouver, British Columbia -- Canada's gateway to the Pacific Rim. The first of these biennial trade shows -- FOOD PACIFIC '86 -- was a major success, receiving worldwide acclaim.

FOOD PACIFIC '88 attracted some 500 exhibitors from 26 countries and over 10,000 trade visitors from 56 countries. Results from the Impact Study indicate that estimated sales attributable to FOOD PACIFIC translates to approximately $27 of sales for every $1 expended by exhibitor -- unquestionably a significant return to exhibitors on their investment in the trade show. Even more international participants are expected than the number attracted in 1988.

The next edition - 1990 - will continue to focus on the Pacific Rim, inviting attention to the world's largest market place of almost 2 billion people who spent over $1.2 trillion in 1984 on food - over 40 percent of the world's total outlay on food. Vancouver will play host to this event attracting worldwide participation. The success of FOOD PACIFIC '88 demonstrated that this biennial exhibition has now firmly established a reputation as credible, viable, and relevant to participants in all aspects of the food, beverage and allied industries.

Trading opportunities will abound for both domestic and international markets with the consumer receiving the ultimate benefit from the exchange of up-to-the-minute food product knowledge and information on technological advances. Participants in FOOD PACIFIC '90 will include food chain retailers, importers and exporters, food wholesalers, distributors, hotels, restaurant and institutional buyers.

FOOD PACIFIC '90 will offer numerous benefits to participants including exposure to new products, new processing and packaging technology; access to numerous business information services including a vast network for those interested in pursuing joint ventures, technology transfers, licensing and brokering arrangements; and access to Canada's newly created international finance and banking center -- Vancouver. Among the types of products to be exhibited are food, beverages, seafood, floriculture, horticulture, new food processing and packaging technology and the newest equipment and machinery related to the food industry.

Those wishing to attend FOOD PACIFIC '90 may obtain further information by contacting: B.C. Food Exhibitions Ltd., 190-10651 Shellbridge Way, Richmond, B.C., Canada V6X 2W8 (604) 660-2288.

EMA To Hold Its 1989 National Educational Conferences And Trade Show At Clearwater Beach, Florida

"Your Keys To The Nineties" is the theme for the Environmental Management Association subsidiaries annual national educational conferences and exposition, to be held November 4-9, 1989 at the Holiday Inn Surfside at Clearwater Beach, Florida.

The EMA subsidiary conferences will offer over 70 different educational sessions led by the leading educators, consultants and suppliers to the environmental maintenance management profession. Educational sessions will run concurrently for the Food Sanitation Institute, Health Care Facilities, Buildings-Grounds Subsidiary and The Linen and Laundry Managers Institute, all subsidiaries of EMA.

In conjunction with the conferences, EMA will also hold its 1989 National Environmental Sanitation Maintenance Management Exposition at the Holiday Inn Surfside on November 5-7, sponsored by the Sanitation Suppliers & Contractors Institute, EMA. The trade show, the premiere gathering of the complete industrial sanitation maintenance industry is already 60% sold, features the latest products and services from manufacturers, suppliers and consultants to the industry/profession.

In addition to educational sessions and the three-day exposition, EMS's conferences will offer attendees golf, tennis and numerous sporting events as well as exciting spouse and youth programs.

EMA and its subsidiaries, a non-profit educational society, represents those individuals who are responsible for the professional activity concerned with the management of the work environment for the purpose of protecting health and safety, and sustaining product quality. It was founded in 1957 and maintains its national headquarters in Largo, Florida.

For more information on the conferences, the exposition, registration and hotel accommodations, contact EMA headquarters, at (813) 586-5710, or write to EMA, 1019 Highland Ave., Largo, FL 34640.

"Colonization Control of Human Bacterial Enteropathogens in Poultry"

The USDA, Agricultural Research Service announces an International Symposium on "Colonization Control of Human Bacterial Enteropathogens in Poultry", September 27-29, 1989 in Atlanta, Georgia. Invited speakers will address the following: Environmental Factors and Sources, Competitive Exclusion, Mechanisms of Colonization and Immunization. Abstracts are invited for poster presentations. For more information and registration material write to: Dr. L.C. Blankenship, USDA, ARS, Russell Research Center, PO Box 5677, Athens, GA 30613

Leaving Out Entire Food Groups May Cut Nutrients

Leaving out entire food categories to try to avoid cancer and heart disease may cause many Americans to consume inadequate nutrients, according to a nutrition expert at Texas A&M University.

Dr. Mary Kinney Sweeten, a registered dietitian and nutrition specialist with the Texas Agricultural Extension Service, said diet modification is not a solution for every person trying to lower the risk of chronic and degenerative illnesses.

Sweeten said a recent report by Dr. Alfred E. Harper of the University of Wisconsin showed that the underlying causes of many illnesses are not nutritional.

She said Harper's report indicated that it is impossible to predict how reducing dietary fat and cholesterol, or increasing calcium or fiber intake, would affect every individual.

People have come to hope that by altering their diet, or by supplementing food with vitamins and minerals, they can avoid cancer, heart disease and osteoporosis, even though not one of these illnesses is directly attributable to nutrition, the report said.

"Those thinking along this line typically speak out against consumption of fat, sugar and salt. However, high-fat, high caloric foods are rich in nutrients needed by children and adults," Sweeten said.

Some nutrition experts encourage the reduction of saturated fat and cholesterol to keep serum cholesterol low, Harper said in the report. Serum cholesterol reduces the incidence of heart disease, Harper's research showed.

Reducing dietary cholesterol does not always increase the level of serum cholesterol, making it evident that not everyone can benefit from these dietary reductions, according to the report.

While many health professionals recommend that Americans consume more fiber, all we know is that fiber, like cholesterol, does not affect everyone the same ways, she said.

Sweeten said although physicians should provide dietary guidance for some patients, it is inappropriate for public health officials to assume that everyone is equally susceptible to chronic and degenerative diseases, thus creating fear about eating certain foods.

"Leaving out specific foods from diets may give some people confidence that they are doing what they can to stay healthy," Sweeten said.

She said problems exist, however, when public officials suggest that by eliminating categories of food, the risks are covered.

"In reality, the foods left out may provide necessary nutrients, and are certainly enjoyed by many people," Sweeten said.

How Important Is A Fiber-Filled Diet?

The news is flooded constantly with claims that Americans must eat more fiber, but how realistic is this information?

Dr. Mary Kinney Sweeten, a registered dietitian and nutrition specialist with the Texas Agricultural Extension Service, said total dietary fiber is a new term for what used to be known as bulk, roughage, bran, fiber or unavailable carbohydrates.

Sweeten said current research indicates that many studies have been done to evaluate total dietary fiber and decide what physiological effects fiber has on humans.

She said the most widely recognized effect of fiber in the diet is increased intestinal bulk and regularity, resulting from eating water insoluble dietary fiber sources such as bran, beans, and cellulose.

"The fact that fiber has the ability to lower serum cholesterol is important to today's health conscious lifestyles. The research showed that such soluble fibers as guar gum, locust bean gum, oat gum and pectin have significantly reduced total serum cholesterol levels," she said.

Sweeten said that insoluble dietary fibers are able to bind bile acids that force the body to synthesize more from available cholesterol.

The research cited scientific problems that occurred when the fat content of a diet was reduced, making it impossible to tell if beneficial results are from increased fiber or from the corresponding decrease in the fat intake.

Sweeten said fiber is beneficial for diabetics. Studies show improved control of blood glucose levels and reduced insulin requirements when high fiber diets are consumed.

Research data also suggest that eating a diet high in fiber may reduce individual risks against colon and rectal cancer.

"Finding the right foods to eat each day to meet the recommended daily intake of fiber should not be too difficult for most people," Sweeten said.

The amount recommended by various health organizations of 25 to 30 grams per day can be obtained from foods such as whole wheat bread, oatmeal or bran cereals, fruits and vegetables, especially the skins of apples, pears, peaches and potatoes. Popcorn, seeds and dried fruit also are good sources of fiber, according to the report.

Food and Environmental Hazards To Health

Multistate Outbreak of Sporotrichosis in Seedling Handlers, 1988

Between April 23 and June 30, 1988, 84 cases of cutaneous sporotrichosis occurred in persons who handled conifer seedlings packed in Pennsylvania with sphagnum moss that had been harvested in Wisconsin. An outbreak-related case was defined as physician-diagnosed sporotrichosis in a person who had handled seedlings and/or moss. Confirmed cases occurred in 14 states: New York, 29 cases; Illinois, 23; Pennsylvania, 12; Ohio, 5; Wisconsin, 3; Connecticut, North Carolina, and Vermont, 2 each. Each of these persons handled seedlings from April 4 to May 16, symptoms developed between April 23 and June 30.

Twenty-one (37%) cases occurred in state forestry workers and garden club members who participated in annual tree distributions in which seedlings were separated from one another, repacked in moss, and distributed to area residents. In addition, 12 patients had received seedlings through these distributions, 38 had purchased seedlings directly from nurseries, and 3 were nursery workers. All patients had contact with seedlings distributed by two Pennsylvania nurseries. *Sporothrix schenckii* was cultured from skin lesions of 38 persons and from 5 samples of unopened bales of moss obtained from one nursery.

Sphagnum moss harvested in Wisconsin is shipped to nurseries in more than 15 states, and the involved Pennsylvania nurseries ship seedlings and moss to 47 states. Further epidemiologic and laboratory investigations are underway. **Editorial Note:** *Sporothrix schenckii* is a dimorphic fungus found in moss, hay, soil, and decaying vegetation. Previous outbreaks associated with Wisconsin sphagnum moss have occurred. The largest reported U.S. outbreak involved 17 forestry workers in 1976.

Sporotrichosis most commonly presents as papules or skin ulcers on the upper extremities with lymphangitis spread and painful lymphadenopathy. It is frequently misdiagnosed, resulting in delay of appropriate oral potassium iodide therapy. Incision and drainage are contraindicated as they may worsen skin lesions. Amphotericin B is reserved for disseminated disease, which occurs rarely.

Clinicians should consider sporotrichosis in patients with chronic cutaneous lesions and appropriate exposure histories. Protective clothing (e.g., gloves and long-sleeved shirts) should be worn when potentially infected materials such as sphagnum moss or seedlings are handled.

MMWR 10/28/88

Hemorrhagic Colitis Due to *Escherichia Ccli* (Verotoxigenic) in Canada

Background Trends: Of the many verotoxin-producing serotypes of *E. coli* which cause bloody diarrhea in man, only 0157:H7 has come under close scrutiny in recent years. In Canada, there has been an exponential rise in the number of human isolates of this serotype since it was first recognized in 1978. In 1987, a total of 1342 isolations were made from cases of diarrhea or hemolytic-uremic syndrome (HUS). The number of outbreaks reported to LCDC has also been increasing each year since 1982.

Only 2 isolates have been obtained from foods which have been suspected to be responsible for outbreaks in Canada. They were from ground beef in a nursing home outbreak and veal chops in a family outbreak.

Current Outbreak of *E. coli* 0157:H7: Two institutional outbreaks were reported in Canada in July 1988. In a nursing home in Regina, Saskatchewan, there were a total of 63 suspected cases among residents (39 culture-positive) and 18 among staff (1 confirmed). In a Keswick, Ontario facility for severely retarded young people, 25 of 29 residents were ill with diarrhea, which was bloody in some (14 culture-positive). One of these cases, a 14-year old, died. There have been 14 staff cases.

Communities with an Increase in Sporadic Cases: Also in July, the provinces of Manitoba and Newfoundland experienced dramatic increases in the number of isolates of *E. coli* 0157:H7 from diarrhea stools. In both provinces, culture for this organism has been routine practice, yet in the 3 years 1985-1987, there was a total of 24 isolates in Manitoba and 11 in Newfoundland. For the month of July, 1988, there have been 25-30 culture-positive cases in each province.

In the metropolitan Montreal region to the end of June, 1988, sporadic cases were being reported at a much higher frequency than during the same period in 1987 (40 vs 8). In early July, the *Bureau regional des maladies infectieuses,* the food inspection service of *Communaute urbaine de Montreal* and the Quebec Ministry of Agriculture, Fisheries and Food issued a joint press release on the occurrence of hemorrhagic colitis and the dangers of undercooking ground meats in particular. During the month of July, fewer cases were reported than in July 1987 (4 vs 7 reported as of August 15).

In the Quebec City area, there has been an increase in sporadic cases of *E. coli* 0157:H7 diarrhea (21 since 1 July); however, this is the first year that routine culture has been widely available.

In Calgary, Alberta, for the first 7 months of 1988, there were 77 cases of *E. coli* 0157:H7-associated hemorrhagic colitis. Nine of 13 HUS cases treated at the Alberta Children's Hospital have been attributed to this serotype. In all of 1987 only 14 cases of HUS were seen. No common vehicles of infection have been identified in these communities.

Cooking of Ground Meats and Control Measures: The majority of cases of hemorrhagic colitis and HUS caused by verotoxigenic *E. coli* in Canada are sporadic and are the result of widespread occurrence of these organisms in the food chain. There is substantial evidence from outbreaks and occasional surveys that meat products play a major role in the transmission of verotoxigenic *E. coli*. As with most bacterial contamination of meat, it is almost exclusively the surfaces of raw meat that may harbour the bacteria. In the grinding process, surface contaminants will be spread throughout the uncooked ground meat product (hamburger patty, meat loaf, meatball, etc.). It is essential, therefore, that foods consisting of or containing ground meats be cooked thoroughly to ensure that bacteria in the interior of the product are killed. This is true for foods prepared at home as well as in institutions and restaurants. Unpasteurized milk can also be a vehicle for transmission of this organism and, indeed, many others; consequently, neither the sale nor consumption of raw milk should be permitted.

Can. Dis. Weekly Report 8/20/88

Update: *Salmonella enteritidis* Infections and Grade A Shell Eggs - United States

Salmonella enteritidis (SE) continues to be an important cause of outbreaks of gastroenteritis. This report describes recent outbreaks of SE infections that have been associated with Grade A eggs.

Fort Monmouth, New Jersey. From May 3 to May 9, 1988, 88 (47%) of 188 students in a New Jersey college preparatory school developed febrile gastroenteritis. Symptoms included diarrhea, abdominal pain, headache, and fever. Twenty-seven (31%) of the ill students were hospitalized, and all recovered; stool cultures from each ill patient yielded SE. An epidemiologic investigation indicated that homemade ice cream prepared with Grade A raw eggs only 3 hours before consumption was the source of the outbreak. A culture of the implicated ice cream yielded SE. The ice cream had been properly cooled, and no food handling errors were identified.

Asbury Park, New Jersey. An outbreak of SE infections was reported in a group of 100 service organization trainees who had stayed at the same hotel in Asbury Park, New Jersey. Forty-seven (60%) of 78 trainees interviewed reported having had onset of gastrointestinal illness from June 13 to June 16, 1988. Two were hospitalized and recovered; seven stool cultures were taken, and all yielded SE. Epidemiologic data implicated scrambled eggs served on June 11 and 12. In addition, culture of a pooled egg mixture obtained at the hotel yielded SE. Neither the clinical isolates nor the isolate from the eggs were lysine-positive. Since most SE isolates are lysine-positive, a relationship between the SE strains found in the patients and in the eggs seems probable. The implicated Grade A eggs were traced to a farm in Pennsylvania.

Livonia, New York. In late May 1988, an outbreak of gastrointestinal illness occurred among patrons of a restaurant in Livonia, New York. Twelve (38%) of 32 persons who attended a brunch on May 22 reported diarrhea, nausea, vomiting, or abdominal cramps. Stool cultures from four patients yielded SE. Egg omelets made from pooled Grade A eggs were the only food statistically associated with illness. Investigation did not identify improper food handling practices, such as cross-contamination or inadequate storage, which could have played a role in this outbreak. None of the food handlers were ill, and none had stool cultures that yielded *Salmonella*. The implicated Grade A eggs were traced to a Maryland farm.

Editorial Note: A total of 6390 SE isolates were reported for 1987 (16% of total reported *Salmonella* isolates). SE is the second most common *Salmonella* serotype reported. National surveillance data for 1987 indicate continued high isolation rates of SE in the northeast, mid-Atlantic, and south Atlantic regions. Recent isolation rates of SE have also increased in the east north central, mountain, and Pacific regions of the country. The outbreaks described in this report confirm the continuing association between eggs and outbreaks of SE infections. Of the 19 outbreaks caused by SE with a known vehicle reported to CDC in 1987, 15 (79%) were associated with Grade A shell eggs. No vehicle of transmission was known for 11 other reported outbreaks of SE infections in 1987. An examination of data from 1973 to 1987 reveals that most outbreaks caused by SE occur during the summer months. Warm temperatures may provide opportunities for SE to multiply and survive in the eggs during production, transport, storage, or use.

Although food handling errors can contribute to outbreaks of *Salmonella* infections, the outbreaks in Fort Monmouth, New Jersey (ice cream), and Livonia, New York (egg omelet), demonstrate that SE infections can occur even when acceptable food preparation techniques have been used.

An SE control program is being developed by state health departments, poultry scientists, the egg industry, the U.S. Department of Agriculture, the Food and Drug Administration, and CDC. Long-term control of SE may depend on the elimination of infected flocks or use of pasteurized egg products. Proper handling and cooking of eggs can minimize the risk of salmonellosis; thorough cooking kills *Salmonella*.

Clinicians are encouraged to report cases of salmonellosis to local and state health departments. *Salmonella* isolates can be serotyped by most state public health laboratories to aid in epidemiologic investigations.

MMWR 8/19/88

FDA Unicode Pork Temperature Change Based on Toxoplasma

Proposed changes in pork cooking temperature, and hot holding and cold storage temperatures in the Food and Drug Administration's draft Unicode revisions have emerged as the 'major issue' in comments received thus far by the agency, Thomas L. Schwarz, Assistant Director for Program Development in the Center for Food Safety and Applied Nutrition's Retail Food Protection Branch, said recently.

In an update on the Unicode presented August 3 at the annual meeting of the International Association of Milk, Food and Environmental Sanitarians in Tampa, FL, Schwarz said the proposed increase in pork cooking temperature from 150° to 165°F 'came about in a strange way,' explaining:

'We were considering eliminating a separate pork cooking temperature. By making pork like all other potentially hazardous foods -- and requiring a 145°F temperature -- we simplified the code and still had a temperature sufficient to kill *Trichinella* (137°F). While checking this move out, we contacted Dr. J.P. Dubey, (the Agriculture Department's) expert on the parasite *Toxoplasma gondii*. Dr. Dubey was alarmed that we were proposing a reduced temperature. He made us aware that pork is the primary food source of *T. gondii* and that this parasite is not killed until the meat temperature reaches 158°F. We reversed our direction and proposed an increase to 165°F, which provides a little margin of safety.'

USDA's Food Safety and Inspection Service in 1986 lowered its 'safe' pork cooking temperature from 170°F to 160°F, based on a 15° margin of safety over the temperature required for trichina destruction (see FOOD CHEMICAL NEWS, June 23, 1986, Page 24).

Dubey and co-workers at USDA in Beltsville, MD at the request of FSIS, are conducting a national prevalence study of Toxoplasma in swine, using 12,000 serum samples collected during 1983 and 1984. According to an update submitted to FSIS in March [1988] by Dubey, the project may be expanded to include 'refinement of the present thermal death curves for the organism, and later, the determination of the infectivity status of market pork product.'

Schwarz told the IAMFES meeting that FDA's proposed decrease in refrigeration temperatures for potentially hazardous food from 45°F to 40°F was intended 'to slow the growth and lengthen the lag phase for microorganisms such as *Listeria monocytogenes*, *Yersinia enterocolitica*, and other psychrotrophs including *Clostridium botulinum* type E'.

The refrigeration temperature decrease 'also brings FDA recommendations into agreement with USDA's guidelines for meat and meat products to be held for less than five days,' Schwarz said, noting that 'USDA suggests an even colder temperature of 35°F for extended holding of meat and meat products,' and that the proposed 40°F 'approaches the temperature of 32°F that many fish and seafood handlers specify for the best shelf life of their products'.

Schwarz listed the following 'rationales' for FDA's proposed decrease in the hot holding temperature from 140°F to 130°F:

> '130°F provides a sufficient margin of safety above the top level of pathogen growth (127°F for *Clostridium perfringens*): roast beef is already permitted to be held at 130°F; since all foods (except rare roast beef) must be cooked to an internal temperature of 145°F first, this cooking process should sufficiently lower the bacterial load to allow for a slightly lower holding temperature; compressing the 'danger zone' by 10°F at the top may make cooling to 5°F cooler at the lower end more manageable. This is particularly true since we did not suggest an extension beyond 4 hours of the time a food is allowed in the 'danger zone'.

NYSMFS Newsletter, Nov. '88

Human Plague - United States, 1988

As of September 1, 14 nonfatal cases of human plague had been reported in the United States during 1988. Ten cases were in males, and patients' ages ranged from 8 to 82 years. One case occurred in February, three in June, six in July, and four in August. Each resulted from exposure to sources of wild rodent plague in the western United States: four cases were acquired in Colorado, six in New Mexico, two in California, and one each in Arizona and Texas. The cases in Pecos County, Texas, and Costilla County, Colorado, are the first human cases reported from these counties, although wild rodent plague has been detected frequently in both areas.

Seven of the cases presented interesting epidemiologic and/or clinical features:

Case 1. A 41-year-old man was exposed while training falcons in rural areas near Fort Stockton, Pecos County, Texas. The patient presumably acquired infection from a falcon, either through a talon scratch or transfer of an infected flea acquired from rodent prey. The patient developed a left axillary bubo, indicating the site of infection. He denied rodent and ectoparasite contact and claimed his falcons were trained to prey on birds. Immediately before and during his onset of illness, a widespread plague epizootic was occurring in west Texas (12 counties) among Cotton rats (*Sigmodon hispidus*), field mice (*Peromyscus* species), wood rats (*Neotoma albigula*), and cottontail rabbits (*Sylvilagus auduboni*).

Case 2. A 30-year-old male Albuquerque resident acquired his plague infection by skinning a cottontail rabbit in Costilla County, Colorado. He became ill June 3, 2 days after skinning the rabbit. Usually, cases associated with rabbit hunting occur between October and February.

Case 3. Illness in a 12-year-old Zuni Indian boy was diagnosed promptly as plague and treated with oral tetracycline and intravenous gentamicin. He appeared to recover until the sixth day after onset, when he had headaches and recurrence of fever. Physical examination revealed spinal rigidity, and plague meningitis was diagnosed. The boy then was given chloramphenicol and has recovered.

Case 4. An 82-year-old male summer resident of Salida, Chaffee County, Colorado, was hospitalized after he had been found semicomatose approximately 36 hours after collapsing in his home. He was initially treated for cardiac arrythmia (supraventricular tachycardia). Plaque was suspected on the third day of hospitalization when an inguinal bubo was noted and the patient revealed he had been shooting prairie dogs and ground squirrels near his summer home.

Case 7. A 19-year-old male Army recruit had received 0.1 mL Plague Vaccine, U.S.P. (Cutter Biological), intramuscularly (IM) in August 1987 and a 0.2 mL booster dose IM in November 1987. On July 15, 1988, he had onset of illness and was hospitalized with fever, malaise, an inguinal bubo, and multiple insect bites on both legs. He was treated with tetracycline and chloramphenicol and recovered. Exposure to infection probably occurred during military training maneuvers at Fort Hunter Liggett in Monterey County, California. This area is a plague focus that principally involves California ground squirrels (*Spermophilus beecheyi*) and their fleas. During a field investigation in the maneuver area, an intensive localized epizootic was detected and *Yersinia pestis* isolated from fleas.

Case 8. A 23-year-old man who resides in Houston, Texas, was exposed to infection while vacationing in the Vallecito Reservoir area northeast of Durango, La Plata County, Colorado. Environmental investigations of the reservoir area revealed an epizootic in golden mantled ground squirrels (*Spermophilus lateralis*).

Case 14. A 37-year-old woman residing in Kingman, Arizona, had onset of illness on June 24 and was hospitalized June 26. Gram-negative rods isolated from blood cultures were not identifiable by the hospital laboratory and were sent to the Arizona State Public Health Laboratory for identification. However, the culture was grossly contaminated and could not be tested. The patient had been treated with various antibiotics, including gentamicin, and had recovered without complications after 18 days of hospitalization. In late August, the hospital laboratory, in evaluating a new bacterial identification system, tested a culture from the patient and identified it as *Y. pseudotuberculosis*. The state health laboratory identified and CDC confirmed the culture as *Y. pestis*.

The source of this patient's infection is unknown. She had traveled with her dog to northern Arizona, including the plague-endemic areas of Coconino and Gila counties, and had been back in the Kingman area - not known as a plague focus - for 9-10 days before onset. The interval between her return home and onset of illness supports the hypothesis that her dog acquired plague-infected fleas during the trip and that one or more of these bit the patient sometime after her return.

Other cases. The remaining cases of confirmed plague infections in 1988 were clinically typical of plague. The cases originated in plague-endemic areas of New Mexico, Arizona, or California, and illnesses were diagnosed early and treated appropriately.

Editorial Note: More than 90% of human plague infections occur in the southwestern United States - particularly in New Mexico, Arizona, California, and Colorado. However, plague may occur in residents of or visitors to areas of other western states. In 1988, three of the four Colorado patients (cases 1, 4 and 8) were visitors to the state, and all were hospitalized in areas where human plague is occasionally recognized. Diagnosis would probably have occurred later for two of the patients had they returned to their nonendemic home states before onset of illness. The Arizona patient (case 14) probably was exposed to infected fleas that infested her dog while she and her dog visited plague-endemic areas of the state. She developed an inguinal bubo, consistent with cases of flea-bite origin.

Typically, more than half of human plague cases occur in males (137 [57%] of the 239 cases from 1975 to 1987), and approximately half occur in persons <20 years old. Ten (71%) of the 14 cases in 1988 have been in males, and the mean patient age was 30.1 years, although this average is skewed by the two patients >75 years of age.

From 1975 through 1987, 30% of all human plague cases were in Native Americans. This trend continues in 1988; four (29%) of the 14 patients were members of the Navajo and Zuni Tribes. Risk factors for Native Americans include residence in plague foci and lifestyle (e.g., sheepherding, hunting of prairie dogs and rabbits, and living in rustic dwellings [e.g., hogans] that may attract rodents).

Plague Vaccine, U.S.P., is commercially available from Cutter Biological in Berkeley, California, and is recommended for persons repeatedly exposed to possible plague infection (laboratory personnel or persons with frequent and regular contact with rodents in plague-infected areas). The manufacturer's recommended adult dosage is one dose of 1.0 mL, followed by a second dose of 0.2 mL given 4-12 weeks after the first infection. A second booster of 0.2 mL is suggested 3-6 months after the first booster. Additional boosters of 0.1-0.2 mL each are advised at 6-month intervals as long as risk of exposure persists. This schedule differs from that recommended by the immunization Practices Advisory Committee of the Public Health Service, which suggests two doses of 0.5 mL Plague Vaccine 4 weeks apart, followed by a third dose of 0.2 mL 1-3 months after the second injection. The two-dose regimen given in case 7 did not prevent infection or serious illness, although the course of illness might have been more severe without prior vaccination. That patient reportedly had evidence of multiple insect bites on the legs, and the severity of illness may have been related to the dose of plague organisms inoculated.

MMWR 10/28/88

Industry Products

The products included herein are not necessarily endorsed by Dairy, Food and Environmental Sanitation

MAX Combustion Efficiency Analyzer Portable Unit Measures 0_2, CO, Combustibles, Temp & Efficiency

Teledyne's MAX Portable Combustion Efficiency Analyzer makes it easy to maximize the efficiency of boilers, furnaces and practically any combustion process. The MAX measures four flue gas parameters (oxygen, carbon monoxide, total combustibles, and temperature) and then automatically calculates net combustion efficiency. And with the Compu-Cents feature, the MAX also computes *actual cost savings* based on the price of fuel. A theoretical calculation of CO_2 content is also provided.

The MAX features three LCD displays and a membrane keyboard that allows selective display of any measurements, calculations, and other information provided by the MAX. When connected to a printer, the MAX provides a permanent record of stored data--*including a print-out of its operating instructions*, which are stored in permanent memory (ROM). The MAX's "temporary" memory (RAM) handles up to 20 sets of complete data as well as all calibration settings. Integral battery back-up of the RAM prevents loss of calibration data when the MAX is turned off.

Powered by rechargeable NiCad batteries, the MAX is a completely self-contained unit. Everything needed to measure efficiency is standard, including: Sample probe with Type K thermocouple; flowmeters for sample and calibration gases; a sampling system with mini-pump and condensate trap; battery recharge circuit; and an RS-232C output connection for the optional printer.

Please circle No. 276
on your Reader Service Card

Ropak Corporation Introduces 2.5 Gallon Quality-Pak Plastic Container

Ropak Corporation has introduced for the first time at the 1988 International Dairy Show a 2.5 gallon bulk ice cream container system, the newest addition to its family of Quality-Pak high density, HDPE plastic containers. The injection molded container is the first thin walled, 2.5 gallon plastic container with a proprietary tray holding system.

As a leading multinational manufacturer of plastic manufacturing and material handling products, **Ropak Corporation** currently supplies the dairy industry with its 2 and 1.5 gallon Quality-Pak bulk ice cream containers.

Please circle No. 277
on your Reader Service Card

LifeLines Technology, Inc. *Announces Quality Control System for Perishable Products*

LifeLines Technology, Inc. has announced the release of its LifeLines Quality Control System for perishable products. It is a unique system that allows processors to instantaneously assess the effects of shipping and storage temperatures on the quality of their products without elaborate testing. The System also facilitates the resolution of customer credit issues and insurance claims by providing evidence of temperature abuse at the warehouse, retail distribution center or wherever it may have occurred.

The LifeLines Quality Control System for perishable products, utilizes a temperature-sensitive color-changing bar-coded label and a special hand-held scanner which reads the bar codes and color change of the label and correlates it to product quality information. The hand-held scanner can be used by quality auditors or sales personnel to immediately ascertain a product's condition and assign responsibility for product abuse. Information read from the label is immediately displayed on the unit's display and stored for future reference or documentation.

Please circle No. 278
on your Reader Service Card

The Malthus 2000; Microbiology - Fast, Simple, and Efficient - The Ultimate Solution

Rapid detection of a wide range of microorganisms in the food, dairy, cosmetic and allied industries can now be carried out simply, efficiently and automatically by the new Malthus 2000 Microbiology System. Tests that take days to complete by traditional methods can now be completed in just hours.

Believed to be the most advanced microbiology system of its type in the world, the Malthus 2000 may be operated by non-technical personnel and can provide customers with unattended analysis around the clock.

Complete with sample handling facilities that minimize sample preparation, the fully integrated Malthus 2000 streamlines laboratory procedures. Simultaneous testing of up to 480 samples can be achieved over a temperature range of 5 to 56°C. Analysis time for microbiological tests including (but not limited to) total viable count, coliforms, yeasts, and Salmonella are significantly reduced. Due to the simplicity of this method, production quality assurance can be enhanced and the risk of product recall due to microbial contamination is reduced.

Malthus Instruments Limited, a **Radiometer** company, is supported worldwide by a dealer network and a fully qualified team of microbiologists and engineers who provide training, technical support and service.

Please circle No. 279
on your Reader Service Card

A New Concept in Temperature Recording

Foss Electric (Aust) Pty. Ltd. announce the release of the Auscord Micro Processor-Controlled Temperature Recorder developed by **Foss** in Australia.

The Auscord will monitor and record temperature conditions under which many products are stored, manufactured and transported.

The Auscord provides immediate information on temperature levels with a concise ledgible annotated printout. Unlike most chart records the Auscord drives a microdot printer, printing onto plain inexpensive cash register paper no messy ink pens or expensive pre-calibrated charts are required.

Opreating on 12 volt AC or DC power with an outer case made from die cast aluminium, the Auscord will record temperature in many environments normally hostile to electronic equipment, whilst its accuracy ensures it can be used as a laboratory instrument.

The standard Auscord, developed for use in the dairy industry, has a temperature range of 0 - 40 degrees Celcius. The unit also has a two digit electronic display and is programmed to print the temperature every six minutes. The time and date are printed on the chart at regular intervals.

The Auscord temperature range and frequency of temperature monitoring can be customized during production and **Foss** will examine and report on the feasibility of any recording function desired be it single or multi channel.

A controller option enables the Auscord to not only monitor but also control two external apparatus such as refrigeration compressors. This control module also features an alarm circuit activated should any parameters be exceeded or if any part of the controlled system including the Auscord fail.

Please circle No. 280
on your Reader Service Card

New Oxygen Analyzer

Systech Instruments, Inc. is pleased to announce the introduction of the new model 2550 trace oxygen analyzer.

The model 2550 is ruggedly constructed, simple to calibrate and requires no special operator skills. No periodic maintenance is required. The same instrument may be used to measure oxygen levels from 0.1 ppm to higher percent levels.

The instrument works well on almost all industrial gases and in a wide range of applications. It is ideally suited for controlled or modified atmosphere packaging, head space, glove box, reactors, inert gas blanketing, etc.

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New High Out-Put Thermo-Fogger Controls Insect Pests!!

The **Thermo-Fogger Company** in Libertyville, IL, has just introducted their Model F-2107 High Out-put Thermo-Fogger which is designed for controlling insect pests in large areas.

It lays down a rolling, thick blanket of pest killing fog which penetrates into every place insect pests can hide, and it utilizes an exclusive 2-stage fogging system which preheats and pumps insectcide into a chamber mixing it with hot exhaust.

Power is supplied by a 5 h.p. 4-cycle Briggs & Stratton engine with a factory setting of 3000 rpm and a fuel capacity of 2 quarts with a running time of approximately 1 hour.

The formulation output is from 0 to 6 gallons per hour of oil based insecticide. The weight is 78 pounds. Size is 26" long by 22" high by 23" wide and fog particle size is controllable from .5 to over 50 microns.

The Model F-2107 is perfect for indoor or outdoor use when fogging instructions are followed. A kickstand for parking in an upright position is provided.

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on your Reader Service Card

Clean Room Engineering

Clean Room Engineering, a division of **Clean Room Products, Inc.**, offers advanced design and construction services to firms requiring contamination control and clean room facilities. **Clean Room Engineering** has built more than 1000 clean rooms, using a unique, four-phase, systematic approach to facility design.

Clean Room Engineering has created clean environments for a wide list of industries including: micro-electronics, medical device, printing, computer, precision components biotechnology, pharmaceutical, aerospace, optical/laser and food processing.

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Nelson-Jameson Announces Availability of Sam Gray Gold Electrode

The Sam Gray Gold Electrode, highly recommended for its accuracy and reliability in determining pH in hard cheeses, is now available through **Nelson-Jameson, Inc.** The Wisconsin-based company has acquired the business of Mr. Sam Gray, who for many years had produced the electrode.

Listed as a standard testing method in *Standard Methods for the Examination of Dairy Products*, Sam Gray's gold electrode is relied upon by major cheese buyers and producers for establishing definitive pH readings in hard cheeses. In this application its performance is considered superior to covnentional glass pH electrodes.

In recent years, due to ill health, Mr. Gray had curtailed production of the electrode. **Nelson-Jameson**, in purchasing the company, has pledged to maintain the supply of electrodes and spare parts required to serve the cheese industry. Manufactured to meet the standards established by Sam Gray, each electrode is tested using A.P.H.A. procedures before shipment.

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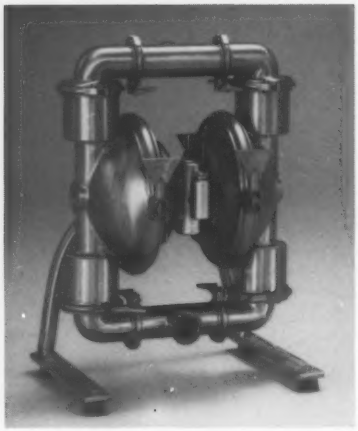

Wilden Pump & Engineering Company announces the "Foodmaster" pump with optional stand.

The "Foodmaster" is an air-operated, double-diaphragm, USDA accepted sanitary pump. The optional stand, when affixed to the pump, supports the unit during pump take down and reassembly. This added feature allows the operator to pivot and lock the pump into the desired position, providing quicker and easier access to internal parts during routine maintenance.

Please circle No. 241
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Thermal Assay Probe

The Thermal Assay Probe, a novel specific enzyme probe has just been introduced by **ThermoMetric**. Based upon the combination of immobilized enzyme technology for specificity and heat of reaction as the detection mechanism, the TAP allows for the specific detection of virtually any biological substrate. Capable of being used in the continuous flow or flow injection mode, the TAP has been found indispensable in a wide variety of uses. With over 2100 specific enzymes known and characterized, the TAP is an extremely flexible choice for biospecific monitoring.

Please circle No. 243
on your Reader Service Card

Low Cost Flowmeter For Industrial Effluent Flow Monitoring

The WDM-1 effluent flow monitor can drastically reduce your sewerage charges. Featuring the accurate and reliable MICROGAGE level sensing probe, the WDM-1 is easily installed in exisiting pipelines. The MICROGAGE probe is non-fouling and resistant to a wide variety of chemicals and solids. The WDM-1 can trigger wastewater samplers and offers a wide variety of recordings and control output options. The WDM-1 can even be equipped with an internal solid-state datalogger for generating reports of flow and other water quality data. Produced by **Montedoro-Whitney**.

Please circle No. 242
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***Weatherchem** Molds Innovative Dual-Flap Threaded Closures From Soltex Polypropylene Resin*

The Flapper line of dual-flap threaded closures for plastic and glass containers is designed to provide superior dispensing convenience for products such as spices, nutritional supplements, nondairy creamers, bacon bits, grated cheeses and health-care products. These dual-flap closures, which are produced by **Weatherchem Corporation** from Fortilene 1602A polypropylene resin, have self-cleaning sprinkle holes on one side and a large opening or spooning on the other.

Please circle No. 244
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New ISO-Grid Coliform/E. Coli/Mug Test - The Perfect Marriage

In recent years, the use of MUG (4-methylumbelliferyl- -D-glucuronide) has become a popular means of detecting the presence of *E. coli* in food samples. The most common approach has been to add MUG to one of the broth media (eg., LST, BGLB or EC) used in the tube MPN coliform method. After 48 hours incubation, the tubes are examined under long-wave ultraviolet (UV) light. Tubes fluorescing blue-white are presumed to contain *E. coli* and are confirmed biochemically with the conventional IMViC test. MUG has also been incorporated into VRB agar. Colonies surrounded by a fluorescent zone are counted under UV light after overnight incubation and then subcultured and confirmed.

Researchers using the method outlined above have reported confirmation rates of 90 - 96%, depending on the test format. Also, people using these methods have found that the length of incubation time required to obtain a MUG positive reaction was anywhere between 24 and 72 hours.

In the recent AOAC Collaborative Study of **QA Laboratories'** ISO-GRID coliform/*E. coli* MUG procedure, the MUG reaction was obtained consistently with only a 2 hour incubation step, and with a confirmation rate of 99.5% (based on nearly 400 MG-positive isolates). Now an official AOAC method.

Please circle No. 245
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*New Low Cost Convenient **Sanaline** Disposable Monitor*

Sanaline announces the introduction of a new convenient disposable membrane filtration monitor for microbiological analysis of liquids.

Sanaline monitors feature a unique Steri-Port design that provides built-in convenience in usage. Each pre-sterilized monitor is shipped completely sealed, with a protective cap over the port, and a specially designed luer which will completely cover the port and protect it from accidental contamination. This unique design ensures consistently reliable test results.

Sanaline Steri-Port monitors contain a Gelman Sciences GN-6 membrane filter, assuring maximum consistent recovery of microorganisms. This Gelman filter, exclusive with **Sanaline** monitors, meets EPA requirements for water testing.

Sanaline monitors are especially compact, saving precious space in incubators. **Sanaline** Steri-Port monitors also offer the added convenience of 125 milliliter capacity, allowing sufficient "head room" for foaming.

Sanaline also has a complete line of microbiological media in convenient color-coded plastic ampoules.

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Online Analyzer Measures Parts-Per-Billion 0_2 Contamination

Teledyne's Model 316R Trace Oxygen (0_2) Analyzer monitors 0_2 contamination in nitrogen, argon, helium and many other pure gases and gas mixtures. The Model 316R accurately monitors oxygen from parts-per-million (ppm) to parts-per-billion (ppb) levels. Gas monitoring with the Model 316R is important for process control, quality assurance and process protection in a wide variety of industrial applications.

The heart of the Model 316R is **Teledyne's** highly accurate Micro-Fuel Cell 0_2 sensor. This maintenance-free electro-chemical device features an absolute zero and an output that is linear with respect to oxygen concentration. That means no zero gases are required and atmospheric air (209,500 ppm 0_2) can be conveniently used for calibration.

The Model 316R features four full-scale switch-selectable ranges: 0-10, 0-100, 0-1000 and 0-10,000 ppm 0_2. Also available are optional ranges as low as 0-1 ppm 0_2! Other features include: A special span range for air calibration; signal output; integral meter readout; and optional alarms.

Please circle No. 247
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***Labconco** Publishes Rapid Kjeldahl Methodology for the Determination of Nitrogen in Milk Products*

Labconco Corporation, Kansas City, MO., has published a rapid kjeldahl methodology for the determination of nitrogen in milk products.

This methdology details apparatus and reagents used in the process. The determination procedure is given with step-by-step instructions.

The methodology is based on data which was tested in **Labconco's** laboratories with **Labconco** Rapid Kjeldahl Apparatus.

For a free copy of **Labconco's** Methodology for the Determination of Nitrogen in Milk Products using Rapid Kjeldahl System circle Reader Service No.

Please circle No. 248
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Free: Handy Guide on "How To Handle Ammonia"

For those who use anhydrous ammonia, or would like to know more about its uses and further information, a helpful, 4-page brochure is being offered free by **Hamler Industries, Inc.**

Included in the brochure are properties, applications, handy hints, safety checks and general facts regarding the use of this important chemical. Up-to-date data about "what you should know about ammonia" makes it a handy reference guide.

Hamler Industries is one of the largest, independent purveyors of metallurgical grade highest purity ammonia now available. With a background of over one hundred years in this business, **Hamler** has branches in most major cities throughout the Eastern, Southern and Central regions of the U.S., where its branches appear in many of the yellow pages of telephone directories. Many of the nation's largest dairy, meat, fish, fruit and vegetable packers and packagers use **Hamler** ammonia in their production operations.

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Sani-Tech sanitary PVDF quick disconnect luer lock fittings and ports provide the optimum bacteria-free access for sanitary sampling.

Sanitary PVDF Quick Disconnect Luer Lock Fittings and Ports Provide Fast, Efficient, Bacteria-Free Sampling

The **Sani-Tech** sanitary quick disconnect PVDF Luer Lock fittings and ports offer maximum heat-resistant, chemically inert, bacteria-free protection for aseptic sampling and conveyance of buffering or reagent solutions.

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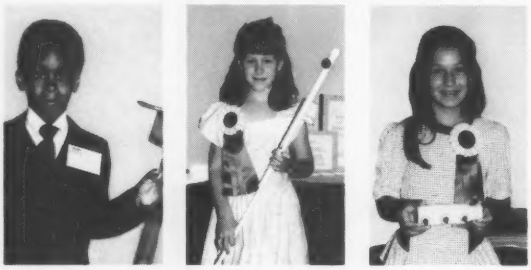
Affiliate News

What kind of a kid do you suppose Thomas Edison was?



Bet he looked at problems and saw solutions. Like Maurice Scales who invented Baby No-Mash to prevent doors from closing on little fingers.

Bet he saw how things were done, and imagined better ways to do them. Like Lillian Lukas who invented the Puddle Detecting Cane for the blind.

Bet he watched how things work and thought of ways to avoid wasting time or effort. Like Caitilin McCracken who invented the Orphan Kitten Feeder for Three.

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Upcoming IAMFES Affiliate Meetings

1989

JUNE

6-7, Texas Association of Milk, Food & Environmental Sanitarians annual meeting to be held at the Green Oaks Inn, 6901 West Freeway, Fort Worth, TX 76116. For more information, contact: S. Edith Mazurek, 4032 Acacia St., Fort Worth, TX 76109. 817/921-4816.

14, Tennessee Association of Milk, Water and Food Protection will hold its annual meeting at the Ramada Inn Airport, Nashville, TN. For more information, contact: Dennis Lampley, RT #1, Box 468-B, Bon Aqua, TN 37025.

SEPTEMBER

19-21, New York State Association of Milk and Food Sanitarians, to be held in Buffalo, New York, at the Sheraton-Buffalo Airport Hotel. For more information, contact: Paul Dersam, 27 Sullivan Rd, Alden, NY 14004, 716/937-3432.

20-21, Wisconsin Associaton of Milk and Food Sanitarians Annual Meeting, will be held at the Holiday Inn East, Madison, WI. Contact: Neil Vassau, PO Box 7883, Madison, WI 53707 608/267-3504.

25-27, Indiana Environmental Health Association Fall Conference to be held at the Howard Johnson, Lafayette, IN. For further information call Tammy Barrett, IN State Board of Health (317) 633-0173.

Authors Wanted

Dairy, Food and Environmental Sanitation is looking for individuals interested in writing articles for our journal. If you are interested, please contact IAMFES for more information,

P.O. Box 701
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Attn: Margie Marble

Food Service Code Interpretations

by
Homer Emery
Food Service Interpretations Committee

Based on comments and information received from IAMFES members it can truly be said that training and certification programs for food service managers are alive and well. While there is some variation in requirements, training methods, and testing being used, the bottom line is that food service managers know a lot more about preventing foodborne illness than they did in the past.

But before we congratulate ourselves, keep in mind that in most states beauty and barber shop employees are required to have far more training. This training often includes more information on personal hygiene, sanitation, disease transmission, and basic chemistry than food service manager certification courses. In addition there are still major cities that don't provide or require any manager training!

Space doesn't permit describing all of the training and certification programs that deserve recognition. Programs conducted by the Illinois Department of Public Health, Fort Worth City Health Department, and Suffolk County, New York, reflect the range of current programs now being conducted. Key features of these programs are the flexibility provided to the industry and the use of standard certification examinations.

Illinois provides 16 hours of training that includes demonstrations using agar plates for showing contamination on the hands, practical exercises involving temperature reduction curves, and homework that requires students to develop cleaning schedules for their facility. These standard examinations are recognized for certification purposes (a state exam, NIFI, and ETS).

The Fort Worth program includes a minimum of 8 hours of instruction offered by the city, community college, or equivalent industry programs. Managers are provided an excellent course manual that includes a copy of the local code and information on local problems. Certification is based on obtaining a passing score on the ETS examiniation.

A unique feature of the 9 hour Suffolk County program is an option for taking the final examination either in written or oral form. Operators unable to pass the exam because of a language problem are field evaluated. Certification can also be obtained based on NIFI, ETS, or other state training programs.

Any discussion on food sanitation training would not be complete without recognizing the valuable contributions made by a few public health pioneers. As early as 1936 training programs in food sanitiaton were being developed and presented by Lewis Dodson in Texas, H.S. Adams in Flint, Michigan, and D.W. Lewis in New Mexico. We owe a great deal to these professionals who paved the way for current certification programs.

OFF THE CLIPBOARD: -How many of you can recall some of the movie and slide sets used in early training programs? "Slinging Hash" Texas Department of Health 1940; "Dating Out" City Health Department, Flint, Michigan 1940; "It's No Picnic" New Mexico 1941; "Tommy Fork and His Fountaineers" 1945; can you recall other classics?

-Seems like every store with a deli operation is wanting to vacuum package foods ranging from meats and poultry to pickles. This will likely result in numerous questions to local health departments. FDA has requested the National Advisory Committee on the Microbiological Criteria for Foods to review this issue. In the meantime FDA has provided regulatory agencies six essential control steps for vacuum packing operations at the retail level. To obtain a copy of the FDA guidelines for vacuum packing send a SAS envelope to: IAMFES FDA Interpretation Committee, P.O. Box 1832, Frederick, Maryland 21701.

Homer C. Emery, R.S.,
Chairman, IAMFES FDA Interpretations Committee

Synopsis of Papers for the 76th Annual Meeting

Abstracts of papers to be presented at the 76th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc. to be held in Kansas City, MO., August 13-17, 1989.

Family Style Meal Service From An Environmentalist Point of View, *Karen J. Tiggs, B.S.*, City of Albuquerque, Environmental Health Department, P.O. Box 1293, Albuquerque, NJ 87103.

The use of day-care centers from the mid 1970's to the present has changed dramatically and how day-care centers operate has also changed during this period of time. A new concept implemented in the late 1980's is family style meal service. This concept in meal service allows the child to prepare his/her plate during meal time. Studies by nutritionists indicate that children consume more food when they are able to prepare their own plate instead of having a plate prepared for them.

The success or failure of family style meal serivce in centers across the U.S. weighs heavily on proper training of the center staff and children from the regulatory health official. A study to determine how successful hand-washing vs. growth of pathogens in a university lab school was done along with a follow-up study on handwashing after the children had proper hand-washing training. A definite decrease in pathogens could be observed on blood agar petri dishes. Hand-washing games were also implemented so that the children would wash their hands successfully everytime.

There are many perceptions on how a program like this can or cannot work. Environmentalists and other health practitioners can use this data to better reduce the intentional and non-intentional illness epidemic that can occur from this type of meal service if staff and children are not properly trained.

Upon discussing this data, health practitioners can prepare guidelines for successful and approved methods to implement a family style meal service program in the day-care centers in their jurisdiction. While these elements cannot guarantee program success, they do appear to make significant contributions to the overall effectiveness of compliance efforts.

Evaluation of Air Samplers for Recovery of Artificially Generated Aerosols of Pure Cultures in a Controlled Environment, *Young-jae Kang and Joseph F. Frank**, Department of Food Science and Technology, University of Georgia, Athens, GA 30602.

An AGI-30, Andersen 6-stage Sieve Sampler, RCS Sampler and Millipore membrane filter sampler were evaluated for recovery of artificially-generated aerosols of pure cultures of *Pseudomonas fluorescens, Escherichi coli, Streptococcus faecalis* and endospores of *Bacillus subtilis*. Size distribution of the aerosol was analyzed to determine its relationship to sampler efficiency. The Andersen sieve sampler recovered significantly greater numbers of non-sporeforming bacteria, with least variability and the RCS sampler recovered significantly smaller numbers and exhibited greatest variability of the 4 samplers tested. AGI-30 and Filter sampler performance varied depending on the species tested. For recovery of bacterial endospore, the Filter and Andersen samplers both recovered greater numbers than the AGI-30 and RCS sampler. The RCS sampler recovered a significantly lower number of spores with the most variable results of the 4 samplers. Our data indicate that the Andersen sieve sampler is the sampler of choice for recovering microbial aerosols of interest to the food processing industry.

The Effect of Prior Heat Shock on the Heat Resistance of *Listeria monocytogenes* in Meat, *Dr. J. M. Farber* and Dr. B. E. Brown*, Microbiology Research Division, Bureau of Microbial Hazards, Food Directorate, Health & Welfare Canada, Tunney's Pasture, Ottawa Ontario K1A 0L2.

Although the heat resistance of *L. monocytogenes* in dairy products has been intensively studied, little data is available on the thermal resistance of the organism in meat products. Irradiated meat was inoculated with *L. monocytogenes* to give a final concentration of 1.0-2.0 x 10^7 CFUg. In initial experiments meat was heat-shocked at 48°C, prior to being heated at test temperatures of 62° or 64°C. Increases in recovery of *L. monocytogenes* of slightly over one log were observed in those meats which had been pre-heated at 48°C. Experiments done to compare the heat resistance of cells which had been heat-shocked for 30 min, 1 h or 2 h showed that the latter time, provided for the greatest increase in recovery as compared to control (non heat-shocked) cells, i.e., an increase in recovery of *L. monocytogenes* of approximately 1.25, 2.2, and 2.7 logs was observed for cells heat-shocked for 0.5, 1.0 and 2 h, respectively. Cells heat-shocked at 48°C for 1 h and left 24 h at 4°C before being heated at a test temperature of 64°C, still maintained their increased heat resistance properties as compared to control cells.

Implementation of Hazard Analysis Based Inspection Programs In Local Health Departments, *Homer C. Emery, Ph.D., RS and Jodena Hennekke, M.S., RS (City of Fort Worth Health Department)*, P.O. Box 1832, Frederick, Maryland 21701.

Foodservice sanitation inspections conducted by local and state health authorities have long been a standard practice aimed at reducing the public's risk of foodborne disease. Recently, several approaches [(HACCP), (SAFE)] for monitoring the foodservice environment have been developed. These approaches are based on the systematic application of food microbiology techniques (pH, water activity, temperature) to control the growth of pathogens in food. Most health authorities agree that these methods represent a significant improvement over traditional inspection methods. However, few local health department have implemented HACCP or SAFE based inspection programs.

This presentation provides strategies for implementing HACCP/SAFE based inspections in local health departments. In addition an approach [Hazard Analysis Physical Plant Inspection (HAPPI)] that combines the analysis of food microbiology factors and an indepth inspection of the foodservice physical plant is described.

Detecting *Listeria* spp. in Naturally Contaminated Seafoods Comparing Four Enrichment Procedures to a Modified Standard FDA Method, *Charles W. Noah* and Nora C. Ramos*, The Food and Drug Administration, 3032 Bryan St., Dallas, Texas 75204.

Four enrichment procedures were used in analyzing 211 raw and processed seafood composites for *Listeria* spp. Detection was made using a commercial ELISA kit. Enrichment methods included buffered and unbuffered Listeria enrichment broth (LEB) incubated for 48 h, buffered LEB with a 24 h transfer step, and a commercial UVM-1 media with a 24 h transfer to UVM-2 media. The composites were also examined by a modified standard FDA cultural method. Unbuffered LEB was the most efficient of the four enrichments for raw seafoods with a false negative rate of 13.8%. Buffered LEB incubated for 48 h was most efficient with a false negative rate of 51.6% for processed seafoods. The FDA method had false negative rates of 10% for both raw and processed seafoods. In raw seafoods, unbuffered LEB compared closely to the FDA method; however, in processed seafoods no enrichments were satisfactory.

Indicators of Food Safety: Conceptions and Misconceptions, *Michael H. Brodsky*, Chief, Environmental Bacteriology Laboratory Services Branch, Ontario Ministry of Health, Box 9000, Terminal "A", Toronto, Ontario, Canada M5W 1R5.

The reliability of indicator organisms to predict significant or detectable levels of foodborne disease causing bacteria in ready-to-eat processed foods was evaluated. The data was compiled from resuls of analyses conducted by the Laboratory Services Branch of the Ontario Ministry of Health between 1985-1988. Approximately 10,000 food samples associated with suspected foodborne outbreaks and about 21,000 "routine" samples were quantitatively examined for significant levels of indicator organisms with the following isolation frequencies: Aerobic Plate Count (24.2%); Coliforms (17.8%); *Escherichia coli* (11.5%); Total Gram Negative Count (13.3%). Where appropriate, protocols for detectable or significant levels of foodborne pathogens were included with the following frequencies of detection: *Salmonella* spp. (0.5%); *Campylobacter jejuni* (0.0%); *Yersinia enterocolitica* (0.0%); *Staphylococcus aureus* (1.2%); *Clostridium perfringens* (0.2%); *Bacillus cereus* (0.6%). These data suggest that food microbiologists need to reconsider the traditional concepts of indicator organisms and the significance placed on their role as predicters of foodborne hazards.

Bacterial Quality of Shakes Purchased at Fast Food Operations, *S. E. Barnard* and R. A. Smeltz*, Penn State University, University Park, PA 16802.

The dairy industry has received complaints about milk shake quality for years. Samples of shakes were purchased throughout Pennsylvania in 1988. Bacterial testing was done within 24 hours of purchase in consumer containers. Over one-third of the nearly 200 samples had coliform counts of less than one per ml. However, 51% of the samples contained more than 10 coliforms per ml. SPC's of 46% of the samples were more than 10,000 per ml., while 30% of the total samples had SPC's above 50,000 per ml. More regulations, sampling, testing and enforcement seem to be necessary to improve shake bacterial quality. Training of persons handling mix, and cleaning and sanitizing freezers is riecessary. Dairy processors, associations and regulatory agencies are interested in developing training visuals and conducting programs.

Problems Related to the Marketing of High Quality Fresh Fish, *George J. Flick*, Food Science and Technology, Virginia Polytechnic Institute and State Univesity, Blacksburg, Virginia.

This project was a culmination of prior programs funded by the Mid-Atlantic Fisheries Development Foundation, Inc. and Virginia Tech on seafood quality and quality maintenance. The purpose of the first part of the program was to conduct a survey of fresh fish marketing practices from harvesting through consumption. Included in the study were three processing and distribution firms employing different levels of sanitary practices. Part I also included specific activities: (1) determine the shelf-life of fish handled under various conditions; (2) determined what effects, customary and alternative handling procedures on fishing vessels, in processing plants, and during transportation, had on shelf-life; (3) identify the appropriate technology for achieving a 12-day minimum shelf-life; (4) establish objective criteria for determining product quality. The second part of the program was initiated to define and solve selected quality problems identified during Part I. Specific program activities included in the fishing vessel section were: (1) effect of day of catch on shelf-life; (2) effect of bleeding and gutting on bluefish quality; (3) effect of a boxing program aboard fishing vessels with respect to quality and profitability. Specific program activities included in the processing and distribution section were: (1) effect of delayed processing on product quality; (2) use of sodium bicarbonate in absorbent pads for controlling odors of tray-packed seafood; (3) effect of a high-pressure wash on reducing the surface microflora and extending the shelf-life of fish. The last part of the program expanded to include the retailer with the primary goal of developing an economically attractive permanent market for quality mid-Atlantic fish. The corroborating retailer chosen for this project was the Kroger Company of Cincinnati, Ohio.

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HALLMARK CENTER TOUR
August 14, Monday
10:00 a.m. - Noon

A guided tour of world famous Hallmark Cards production center. Seeing greeting cards being made is just the beginning of this tour. You can watch craftsmen at work, make your own ribbon bow or hear greetings in various languages. Located in the Crown Center Complex, adjacent to the Hyatt Regency, the Hallmark Visitors Center brings you the sights and sounds of Hallmark through 12 extraordinary exhibits. Hallmark produces 11 million greeting cards and 1.5 million other products each day. There is a special area of entertainment for children ages 5-12 called Kaleidoscope. You will exit onto the Crown Center Shopping Center where you may take lunch on your own at any of the many eateries, and get acquainted with the shopping complex. An all-weather skywalk will return you to your hotel. Cost: Adults *FREE*; Children *FREE*.

A DAY OF KANSAS CITY SIGHTSEEING
August 15, Tuesday
10:00 a.m. - 3:00 p.m.

A bus tour of historical westport district, the famous Plaza shopping area with its many fountains. Lunch at the Rozzelle Court Restaurant (Gourmet). A guided tour of the world famous Nelson-Atkins Museum Of Art. Time to browse the Plaza shops. Cost: Adults *$22.50*; Children (12 and under) *$12.50*.

CANDYLAND TOUR
August 16, Wednesday
10:30 a.m. - Noon

Your host will guide you through the plant where you can learn how chocolate is made and sample treats right off the production line. Witness the making of a batch of old-fashioned peanut brittle (and enjoy a complimentary bag of this specialty) Cost: *$5.50* Per Person.

OTHER SPECIAL EVENTS

We will have an information booth available for events you may attend on your own. Events in which you may be interested include Worlds of Fun and Oceans of Fun, K.C. Royals baseball game, American Heartland Theatre (Broadway Productions), Movie Theatre Playings at Crown Center, famous restaurants, etc. Remember, you will be in the heart of a beautiful complex with many things to see. We did not want to over schedule so you would have time to enjoy Crown Center. The Crown Center is only a 2 block walk from the Hyatt Regency.

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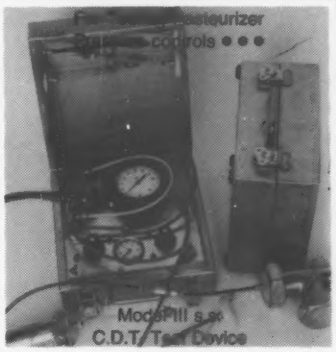

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• **5, Pesticide Applicator Certification Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: Geroge Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **6, Fumigation Seminar 1989,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: Geroge Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **6-7, Texas Association of Milk, Food & Environmental Sanitarians**, annual meeting to be held at the Green Oaks Inn, 6901 West Freeway, Fort Worth, TX 76116. For more information, contact: Ms. Edith Mazurek, 4032 Acacia St., Fort Worth, TX 76109. 817/921-4816.

• **14, Tennessee Association of Milk, Water & Food Protection** will holds its annual meeting at the Ramada Inn Airport in Nashville, TN. For more information, contact: Dennis Lampley, RT #1, Box 468-B, Bon Aqua, TN 37025.

• **13-14. Warehousing Sanitation and Safety Course** will be held at the Ramada Inn-Westport Hotel, St. Louis, Missouri. For more information, contact: Nancy Sullivan at 800-325-3371. In Missouri (314) 725-2555.

• **13-15, Hazardous Materials Management International Conference and Exhibition '89,** will be held at the Atlantic City Convention Center, Atlantic City, New Jersey. For additional information, contact: Mary Jo McGuire, Group Show Director, Tower Conference Management Co., 800 Roosevent Rd., Bldg E -- Suite 408, Glen Ellyn, IL 60137-5835 312/469-3373.

JULY

• **7-14, 9th International Workshop on Rapids Methods & Automation in Microbiology** will be held at Kansas State University, Manhattan, Kansas. For more information, contact: Dr. Daniel Y.C. Fung (913) 532-5654. Certified by the American Society for Microbiology.

• **9-12, International Conference on Technical Innovations in Freezing and Refrigeration of Fruits and Vegetables.** For more information, contact: Robert C. Pearl, Food Science & Technology, University of California, Davis, CA 95616 916/752-0981.

• **17-28, Dairy Laboratory Workshop** to be held at Penn State University in State College, PA. Contact Sidney E. Barnard, Food Science Dept., 8 Borland Lab., University Park, PA 16802 for more details. Telephone (814) 863-3915.

AUGUST

• **13-18, The Society for Industrial Microbiology** announces the 1989 Annual Meeting to be held at the Westin Hotel, Seattle, Washington. For more information, contact: Mrs. Ann Kulback, Business Secretary, Society for Industrial Microbiology, PO Box 12534, Arlington, VA 22209-8534 703/941-5373.

• **14-18, Biotechnology: Principles and Processes** to be held at the Massachusetts Institute of Technology, Cambridge, Massachusetts. For more information, contact: Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139 or Anthony J. Sinskey, Dept. of Biology, MIT, Cambridge, MA 02139 617/253-6721.

SEPTEMBER

• **11, Pesticide Applicator Certification Seminar**, Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **12-14, Basic Pasteurization Course**, to be held at Howard Johnson, 8887 Gateway West, El Paso. For more information, contact: Ms. Janie F. Park, TAMFES, PO Box 2363, Cedar Park, TX 78641-2363 512/458-7281.

• **18-22, Food Protection and Quality Assurance Technology Short Course**. Sponsored by the Food Sanitation Institute, EMA, and Michigan State University, East Lansing, MI. Contact: Dr. William Haines, Food Industry Institute, Michigan State University (517) 355-8295.

• **19-21, New York Association of Milk and Food Sanitarians**, will hold its annual meeting in Buffalo at the Shertaon-Buffalo Airport Hotel. For information concerning the meeting, contact: Paul Dersam, 27 Sullivan Rd., Alden, NY 14004, 716/937-3432.

• **25-27, Acceptance Testing.** Developing a product acceptance capability; qualification of employees and consumers; procedures for laboratory, central location, and home-use testing; design and analysis of acceptance tests. For more information contact: Marjorie Sterling Stone 415/365-1833.

• **25-28, 103rd AOAC Annual International Meeting and Exposition** to be held in St. Louis, Missouri. For more information contact: Marilyn Taub, AOAC, Suite 400, 2200 Wilson Blvd, Arlington, VA 22201-3301. 703/522-3032.

• **25-27, Indiana Environmental Heatlh Association Fall Conference** will be held at the Howard Johnson, Lafayette, Indiana. For more information, contact: Tammy Barrett, IN State Board of Health, **(317) 633-0173.**

• **27-29, Colonization Control of Human Bacterial Enteropathogens in Poultry**, will be held in Atlanta, Georgia. It is sponsored by the USDA, Agricultural Research Service. For more information, contact: Dr. L.C. Blankenship, USDA, ARS, Russell Research Center, PO Box 5677, Athens, GA 30613 (404) 546-3152.

• **27-28, The 1989 Annual Convention of the South Dakota**

Dairy Association will be held at the Ramkota Inn, Sioux Falls, SD. For information, contact: Dr. John Parsons, Dairy Science Dept., SDSU, Box 2104, Brookings, SD 57007 605/688-4116.

• **27-29, Liquitec Expo '89.** For more information contact: Carolyn Mesce, Marketing Manager, Liquitec Expo Inc., PO Box 630, West Paterson, New Jersey 07424 201/256-0011.

OCTOBER

• **1-4, Fourteenth Annual Tropical and Subtropical Fisheries Technological Conference of the Americans**. To be held at Buckhead Holiday Inn, Atlanta, GA. For more information, contact: Keith Gates, The University of Georgia Marine Extension Service, PO Box Z, Brunswick, GA 31523 (912) 264-7268.

• **23-24, Pests Associated with Food Industry and Environmental Sanitation Seminar**, Okumura Biological Institute, Holiday Inn, Elk Grove Village, IL. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **23-25, Quality Control and Stability and Testing.** Organizational approaches to establishing product quality monitoring systems within manufacturing and R&D: methods for measuring product quality and stability, including design and analysis. For more information, contact: Marjorie Sterling Stone 415/365-1833.

• **23-25, California Association of Dairy & Milk Sanitarians** will be held at the Holiday Inn, Visalia, CA. For more information, contact: Jack Coppes (213) 699-4313.

• **25-26, Advanced Course on Pest Recognition and Food Industry Problems,** Okumura Biological Institute, Holiday Inn, Elk Grove Village, IL. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

NOVEMBER

• **4-9, EMA 1989 National Educational Conference and Trade Show** to be held in Clearwater Beach, Florida at the Holiday Inn Surfside. For more information, contact EMA headquarters at 1019 Highland Ave., Largo, FL 34640 (813) 586-5710.

• **6-8, 1989 Food Processing Waste Conference**, will be held at the Omni International Hotel, Atlanta, GA. For more information, contact: Edd Valentine or Chuck Ross, Georgia Tech Research Institute, Economics Development Laboratory, Environment, Health and Safety Division, O'Keefe Bldg, Atlanta, GA 30332 (404) 894-3412.

• **11-15, Dairy and Food Industries Supply Assoc., Inc.** McCormick Place, Chicago, Illinois.

DECEMBER

• **4, Pesticide Applicator Certification Seminar**, Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **5-6, Pests Associated with Food Industry and Environmental Sanitation Seminar**, Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **7-8, Advanced Course on Pest Recognition and Food Industry Problems**, Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

1990

AUGUST

• **15-18, FOOD PACIFIC, 1990** will be held at Vancouver's domed stadium, B.C. Place. Those wishing to attend may obtain further information by contacting: B.C. Food Exhibitions Ltd., 190-10651 Shellbridge Way, Richmond, B.C., Canada V6X 2W8 (604) 660-2288.

OCTOBER

• **7-12, Twenty-Third International Dairy Congress**, will be held in Montreal, Canada. For further information, contact: Richard Stern, Executive Director, International Dairy Congress, 1990, PO Box 2143, Station D, Ottawa, Ontario, Canada K1P 5W3 (613)238-4116.

DECEMBER

• **12-18, American Society of Agricultural Engineers** will be sponsoring the International Symposium on Agricultural and Food Processing Wastes. For more information contact: Jon Hiler, American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MO 49085 616/429-0300.

To insure that your meeting time is published, send announcements at least 90 days in advance to: K.R. Hathaway, Editor, IAMFES, PO Box 701, Ames, IA 50010.

From the Ames Office . . .

By Kathy R. Hathaway

In the May through July issues of DAIRY, FOOD AND ENVIRONMENTAL SANITATION you'll find synopsis of papers being presented this August during the 76th IAMFES Annual Meeting in Kansas City, Missouri. Concurrent sessions will be running for 3 days in the areas of food, dairy and environmental concerns.

The IAMFES Annual Directory will begin production in May and be distributed in August. The Directory gives you all members alphabetically as well as geographically. The IAMFES Executive Board and Committee Chairpersons are also listed, complete with address and phone numbers for your convenience. Save your Directory and use it throughout the year to correspond with other IAMFES members.

The Kansas Affiliate is working diligently to orchestrate a most successful educational as well as fun meeting for all of you and is doing a great job. The Hyatt Regency Crown Center is located in the heart of Kansas City within walking distance of shopping and many fine restaurants. There is now a skywalk which links the hotel with the Crown Center Shopping area which makes all the unique shops very accessible. Local arrangements will have an information booth available on things to do in Kansas City as well as directing you to the fun, rides and water rides of Worlds of Fun and Oceans of Fun for the kids or the young at heart.

Just a reminder to affiliates to call the Ames office if they wish to bid on hosting the 1992 meeting . . . the deadline is upon us.

76th IAMFES Annual Meeting, August 13-17, 1989, Hyatt Regency Crown Center, Kansas Center, Missouri . . . make plans now to attend!

This is my last, "From the Ames Office" column, which will resume when the new Executive Manager is in place. In the meantime, Margie Marble from this office will be interim Executive Manager. I am confident that Margie will make the interim, as well as the Annual Meeting . . . smooth and successful. I'll think of you during Annual Meeting time. My new location will be: K. R. Hathaway, 207 Cincinnati Ave., Huron, OH 44839, 419-433-3521. The best to all of you!

Kathy R. Hathaway
Executive Manager, IAMFES

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This is your Personal Invitation to join IAMFES. As a member of the International Association of Milk, Food, and Environmental Sanitarians you receive many Benefits. Here are just a few.

1. **DAIRY, FOOD & ENVIRONMENTAL SANITATION,** a monthly non-scientific magazine that keeps you up to date on your profession and your association.
2. **JOURNAL OF FOOD PROTECTION,** also monthly, on a scientific level, comprised of research and general interest manuscripts.
3. There are over 20 committees of which you can participate, from Food Equipment Sanitary Standards to Communicable Diseases Affecting Man.
4. As a member you are entitled to vote on important matters affecting your association, as well as voting for officers.
5. A Secretary is elected by the members each year and serves on the Executive Board of IAMFES, moving up in position each year to presidency. You as a member can run for office.
6. The Educational Conference of IAMFES is held each August in a selected city in the U.S. or Canada. As a member you receive a special discount on the registration fee.
7. Free Lending Library. As a member you may check out educational materials from the IAMFES Lending Library. These educational materials are available in slide series as well as VCR tapes. The IAMFES Lending Library is supported by the Foundation Fund through IAMFES Sustaining Members.
8. IAMFES Awards are presented yearly at the Annual Meeting Banquet in August. As a member you are eligible to nominate and be nominated for these prestigious awards.
9. As a student member, graduate students are encouraged to participate in the Developing Scientist Award. Papers are presented and judged during the Annual Meeting with five award winners.
10. The call is on us! A toll free number outside Iowa and inside the U.S. enables members to call the office at no charge, 800-525-5223. FAX 515-232-4736.

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